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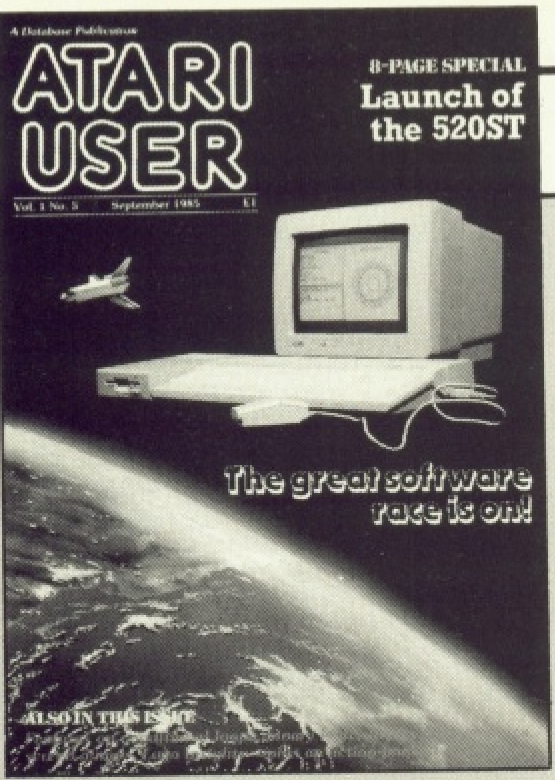
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Tramiel pledges support for the whole range



Jack Tramiel... "our sales projections are high"

ON the eve of the consumer launch in the UK of the 520ST Atari chief Jack Tramiel has pledged continuing support for all the company's current machine range.

In an exclusive interview with *Atari User*, the controversial former boss of Commodore insisted that the arrival of the 16 bit micro will not mark the beginning of the end for Atari's less powerful models.

"We intend to support all lines which Atari has manufactured and are selling", said Jack Tramiel.

"This includes the VS2600 games machine, the 130XE and 800XL computers, the ST line and all future machines".

Questioned about the number of 520STs Atari hopes to sell in the first 12 months, the outspoken head of the Atari clan replied: "Sales projections are high.

"We believe that any company which has smaller than 20 per cent share of the personal computer market will be out of business in the long run".

Battling Jack – as he is known in the States – went on to deny claims that the ST was aimed primarily at the business market.

"Since I started in this business, I've always sold personal computers", he said. "People have the imagination to do what they like with my products".

A suggestion made by a leading UK retailer that the 520ST was too cheap with not enough profit in it for dealers to provide the necessary back up also met with a similar rebuke.

"The profit margins we provide for retailers are comparable to any in the computer industry", he said.

Asked about stories emanating from the US that STs are already being sold before any software is available, he said: "Why people are buying it without software is because for every machine there are stages.

"In the first stage the program developers buy machines. In the second stage the computer enthusiasts and hobbyists buy the machines.

"Then, as software is developed, comes the third stage – the consumer buys".

What will follow the ST? "If you are in Las Vegas in November please visit our booth at Comdex. You will see quite a line of new products . . ."

Hard discs on the way

ATARI hard discs for the 520ST are to have a 10mbyte capacity and will be available in the United States in October.

This was the message from Jack Tramiel when he spoke to *Atari User*.

However he did point out that UK purchasers of the 520ST will have to wait until November for the British versions to be made available.

Spreadsheet released

DISC and cassette versions of Audiogenic's spreadsheet Micro Swift are being released this month for the Atari 800XL and 130XE.

The machine code program is operated by pop-up menus and incorporates advanced functions such as definable column widths and a selectable system of cell formatting.

Price will be around £20.

130XE DEAL

COMPUMART has stolen a march on other dealers by offering a cut-price package incorporating the Atari 130XE.

The company is offering savings of £80 on its Atari package – containing the 130XE, 1050 disc drive and ten blank discs – which now costs £299.95.

DUTCH PICK THE 800XL

ATARI has achieved a dramatic breakthrough in Europe with the news that the Dutch government has selected the 800XL as its recommended micro for the country's schools.

The company now predicts that this will result in sales of 100,000 machines to educational outlets in Holland over the next two to three years.

Atari was given the blessing of the Dutch after months of negotiations and in the face of intense competition from major rivals.

This is now being seen as the key to unlock the door to similar deals all over Europe. However France remains the one country where Atari is unlikely to make much headway, thanks to the chauvinistic attitude of the French themselves.

As part of the Dutch deal the 800XL – named as Home Computer of the Year in the British Micro Computing Awards 1985 – is now to be featured in a television series there.

Breakthrough

This, according to the company, is being designed to introduce school children in Holland to the intricacies of computing, similar to the pioneering BBC series.

"This award is a major breakthrough for Atari computers in Holland", says Rob Harding, Atari UK sales manager. "It was won in the face of formidable competition from Philips, the indigenous manufacturer.

"We believe that this will lead to the 800XL becoming the leading 8-bit micro in education".

Games link with toys company

SOFTWARE house Martech has joined forces with a toy manufacturer and comics publisher in developing its latest release for the Atari 8-bit machines.

In mid-October it will be launching Zoids – The Battle Begins, the first in a series of computer games based on a range of Zoid robot toys made by Tomy.

Both manufacturers are keeping in close touch with Marvel, which is bringing out a comic based on the Zoids' adventures.

Martech says Tomy has orders from all over the world for its dinosaur-like robots – sales of the toys have already reached the two-million mark in the UK.

Tomy is also planning to spend in excess of £1.5m on television advertising alone in the run-up to Christmas. Martech is hoping its partner's promotions will help sales of its own game.

"Zoids have clearly captured the imagination of the same kids who buy computer games", said a spokesman for the company.

The Battle Begins is an arcade game which centres on the battle for supremacy between two warring factions of Zoids. Martech says it involves a lot of strategy.



LASER DISC SYSTEM FOR ATARI

ATARI is set to become the first micro manufacturer to introduce a laser-read compact disc system in this country.

Spokesmen at Atari's headquarters in Sunnyvale, California, and at Slough have confirmed the product is under development and will be released before Christmas with a price tag of about $500 – under £400 at current exchange rates.

The CD ROM player is based on a Philips drive unit and is designed to run with the Atari ST range.

It will be capable of storing 500 mbytes of memory on one 12 cm optical laser disc.

A spokesman told *Atari User:* "We are also thinking of making it an audio product so it will double as an audio player".

A prototype previewed in America recently, running with the ST, stored 20 volumes of an encyclopaedia on one third of its capacity.

There was the full index of the encyclopaedia on another third and high quality graphics related to the material on the other third.

It took approximately three seconds to locate any particular reference using laser scanning.

Drive units developed by Philips and disc and tape manufacturer 3M have been available to North American original equipment manufacturers for several months.

Nigel Murphy, 3M's disc products manager in the UK, has said that CD data storage is "the technology that will substitute for all forms of recording media in 10 to 15 years time".

His company believes optical memory systems will take off within the next few years, with annual disc sales expected to reach half a billion by 1990.

The discs will be able to store a variety of information – standard computer data, graphics, digitised TV pictures and audio.

SOFTWARE IMPORTS FROM USA

DISTRIBUTOR Software Express is importing four utilities and five games for the Atari 8 bit range from the United States.

Homepack is a three-in-one package which includes word processor, information manager and telecommunications program. Price is £49.95.

A word processor called Paper Clip will cost around £50. It enables the user to merge Touch Tablet and other pictures with text and also to print out.

Broderbund's Print Shop, price £40, enables users to create letterheads, greetings, messages, signs and displays. Extra data files cost £20.

Last in the utilities section is B-Graph, a graphics construction program which allows bar or pie charts to be made.

The games are Epyx's Rescue on Fractalus and Ballblazer, Broderbund's book-based Mind Wheel game for an Atari with twin drive, and Microprose's strategic war game, Crusade in Europe, and its Great American Road Race. Cost per program ranges from £30 to £40.

Micro Live returns to the screen

TELEVISION'S Micro Live series is returning to BBC 2 as a result of pressure from computer buffs.

Starting on October 13 the now weekly series will cover subjects ranging from electronic music, micros in schools, the Data Protection Act and the use of computers in timing races.

The battle for the personal computer market is to be featured in a serious film with a lightweight title, Big Blue and the 700 Dwarves.

Micro Live will also take an in-depth look at work being done by the Carnegie-Mellon University in the States on molecular memories and robots, communications and networking.

These, together with other items still to be filmed, will take the series up to December 13 when it will take a break for Christmas. It will return for another 10 weeks starting on January 17.

The program's producers have also taken heed of the viewer's mailbag by introducing more items on personal computers. But air time will also be given to the growing business and communications sectors.

Presenters of the program will be Lesley Judd, Ian McNaught-Davies and Fred Harris. Micro Live will go out on BBC 2 at 7.30pm each Friday.

Two-in-one cassette

A CASSETTE offering two versions of the same game – Boulder Dash – one for the Atari 48k and the other the Amstrad, has been launched by Mirrorsoft.

Said executive Pat Bitten: "It makes sense for dealers to stock only one product catering for two machine markets.

"The two-in-one will not affect the customers who will still be getting the game for the normal £9.95".

Top team for 520ST launch

ATARI boss Jack Tramiel is to spearhead the consumer launch of the 520ST on the first day of the Personal Computer World Show on September 4.

The fact that he is to appear with his American entourage is being seen as a demonstration of the importance attached to the new machine's showing on the UK market.

It was because of this that the first ST machines were shipped to Britain some weeks ago, much to the irritation of would-be developers Stateside.

When questioned about this Tramiel said the decision had been made based on the overwhelming interest shown in the ST when it was unveiled at the Hanover Show earlier this year.

"As an international marketing company we put emphasis on all our markets, but especially Europe", Jack Tramiel told *Atari User*.

In recent weeks UK software houses, like their US counterparts, have been involved in a mad scramble to provide ST products ready for the consumer launch here.

Such has been the interest generated by the machine that most major British companies got caught up in the rush to actually buy ST development systems.

"We even had to wait in line to pay for one", bemoaned a spokesman for one company a little slow off the mark.

Programmers have been working round the clock in an attempt to beat the September deadline. Although many will only be showing "unfinished" products, more than 80 software houses will be featuring their wares on the Atari stand at the PCW Show at London's Olympia.

"There has been nothing quite like it since the gold rush", said one industry observer. "It's as though Jack Tramiel had invited them all to the opening of the Klondike".

TOP VALUE

A REVIEWER in Popular Computing Weekly has described the as-yet-to-be-released Commodore Amiga as the main challenger to the Atari ST range.

However the writer, Andrew Pennell, concludes that the ST is likely to score heavily on price – some £400 cheaper for the basic model, which includes a monitor when the Amiga does not – and the fact that it has more RAM.

Atari bridges the gap

ATARI owners have been invited to help fill a gap in our national heritage caused by the likes of Henry VIII and Oliver Cromwell.

Because of these and other iconoclasts there is no British history of Nativity art as there is in other European countries.

But that is something archivists and historians Count and Countess Andrzej von Staufer intend to correct.

They have organised the First British National Nativity Competition to put Britain alongside the other countries of the world who already have a longstanding tradition of Nativity-making.

It coincides with the Twelfth World Congress of Nativitists, which is hosted by a different country every three years and this year is at Innsbruck, Austria, in December.

The competition, in two parts, will be held at Westminster Cathedral on December 8 and at the Christian Resources Exhibition at the Horticultural Halls in London on February 8.

Count and Countess von Staufer have been working closely with their international counterparts for eight years, as well as with British craftspeople, artists, photographers and – during the past two years – computer graphics artists.

They have been helped by Epson UK, which was involved in the Christmas Archives Exhibition, Folk Nativities of the World, at the Barbican Centre last winter.

The Epson connection with the National Nativity Competition is in the special category for the best computer-generated image of the Nativity.

Any part of the Christmas story may be represented, and entries will be judged on originality, content and approach.

Epson will judge this section of the competition and award a prize to the winning computer artists.

"The winner in the computer category will also compete for the overall Best in Show trophy", Count von Staufer told *Atari User*.

"And it is likely to be given a place in the British Nativity archives which will be going on tour to the United States and leading Commonwealth countries shortly".

Atari owners who want to enter the competition should write to National Nativitists Competition, Christmas Archives, 64 Severn Road, Cardiff CF1 9EA enclosing a 24p stamp.

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MicroLink
in association with
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No. 1 September 1985

NEWSLETTER

£$\frac{1}{2}$m computer to the rescue

THE phenomenal growth of MicroLink has hastened the purchase of additional computer power by Telecom Gold.

Demand for the new electronic mail service has been such that despite the tremendous processing power of a Prime computer, at certain times of the day users have been inconvenienced by motorway-like congestion caused by the large volume of traffic.

Since it started, MicroLink has had to share its computer with the somewhat verbose members of the European Parliament. The traffic jam worsened as subscribers from all over Britain and Europe and as far away as Australia and Japan began logging on in increasing numbers.

With MicroLink growing at more than four times the predicted rate, the result left it no option but to request a separate computer for its exclusive use.

Telecom Gold has come to the rescue and on September 7 MicroLink will be moving to its own £500,000 dedicated system – much to the relief of its own users and the Euro MPs.

The move will enable MicroLink to provide an increasing number of exciting facilities, together with a response time described by its systems manager, Colin Rogerson, as "super quick".

Telecom Gold officials have been staggered by what they describe as "the phenomenon of a specialist service growing so big in such a short time".

Rogerson believes he knows exactly why MicroLink has taken off so dramatically.

"It's more friendly than other electronic mail services, it's informative, and it's fun to use", he says.

It's all systems go . . .

THE ever-ready Help Line came to the assistance of a distinguished early MicroLink subscriber, Conservative MP for Acton Sir George Young.

He mailboxed to say: "The screen does not scroll when it is in the Telecom Gold mode. The new lines simply superimpose on the old, making it very difficult to read messages.

"I have a BBC Micro with a Telemod 2 modem and a Micronet 800 ROM. To access Telecom Gold I have to generate a new Return signal. What am I doing wrong?"

What Sir George was doing wrong was trying to access the service using Micronet 800 software.

Help Line was able to give him two options – either get a Commstar ROM, which has both Prestel and terminal emulation, or keep the Micronet 800 ROM and use it with a terminal emulation program such as Termi.

Shortly afterwards Sir George was able to report "all systems go" at his end of the system.

Popular abroad

NOT only is MicroLink the great new *national* electronic mail service – it's also making a name for itself on the *international* scene.

On the Continent there are already subscribers in Belgium, France, Luxembourg, Spain, Switzerland and West Germany.

Further afield are its members in Saudi Arabia, Australia, New Zealand and Japan.

There are even a couple of subscribers stationed at British Forces bases in Germany, in addition to those in the UK and the Republic of Ireland whose numbers increase daily.

Why is MicroLink so popular abroad?

Says one happy customer: "It's a very good way of sending information by the international PSS system, it's faster and more economical than telex, and it's portable.

"I can take my lap-held computer just about anywhere and still be in touch with MicroLink – at any time of the day or night".

Showing 'em how

MICROLINK will be notching up another first when it goes on-line from the Electron & BBC Micro User Show in Manchester.

A continuous demonstration of the new service will be held at UMIST from September 27 to 29, with experts on hand to reveal the full potential for users.

Stories about the show will be transmitted live over MicroLink's own electronic news pages during the three-day event.

MicroLink forges commercial ties

NEW commercial ties between Britain and Japan are being forged by MicroLink's speed and efficiency.

For several years Bristol electronics engineer Jeff Gearing has been UK correspondent of a Japanese motoring magazine, regularly sending his news reports by mail on floppy discs to its editor, Yuichi Ishikawa.

Other than expensive long-distance phone calls, the two men had to rely on the five-day-minimum airmail service to keep in touch.

Until MicroLink, that is.

Now both Gearing and Ishikawa are subscribers of the fast-growing international mail service, and news about Britain's motor industry gets to Japan in seconds rather than days.

MicroLink has paid off for them in another way – high-speed two-way exchange of up-to-the-minute business information that can be sold as a service to commercial concerns.

And this has led to a further profitable spin-off.

For some time Gearing and Ishikawa had been aware that there was a demand in Japan for luxury European goods, and in Britain for Japanese-made models.

MicroLink is now providing the fast, low-cost medium for import/export orders resulting in an increasing flow of Wedgwood pottery from Bristol and radio-controlled models from Tokio.

YOUR chance to join MicroLink – turn to Page 45

When equals doesn't make all things equal...

Programming made easy – Part V of MIKE BIBBY's guide through the micro jungle

STRAIGHT to work this month. Have a look at Program I. I don't think it should cause you too many problems.

We're just assigning the values 1, 2, 3 to three numeric variables, *NUMBERONE, NUMBERTWO, NUMBERTHREE,* and printing out the value of the variable immediately after each assignment.

```
10 REM PROGRAM I
20 PRINT CHR$(125)
30 NUMBERONE=1
40 PRINT NUMBERONE
50 NUMBERTWO=2
60 PRINT NUMBERTWO
70 NUMBERTHREE=3
80 PRINT NUMBERTHREE
```

Program I

The end result is that:

1
2
3

appears on our screen. A long-winded way of doing things, I admit, but easy enough to follow.

Program II is a different kettle of fish, but, believe it or not, its output is exactly the same as in Program I.

It's sensible enough down to line 40. We clear the screen in line 20, assign the value 1 to numeric variable *NUMBER* in line 30, then PRINT *NUMBER* in line 40.

Line 50 looks decidedly odd, though:

```
50 NUMBER = NUMBER + 1
```

How can a number be equal to itself plus one? That's what line 50 seems to be saying, after all.

The fact is that equals sign doesn't mean equals here – it just tells the computer to do something. The equals sign instructs the computer to do whatever task is given on its right and then label the result of that task with the label on its left.

In this case the micro interprets line 50 as *starting on the right of the equals sign, take the value labelled by NUMBER and add one to it. Then label the answer with the variable NUMBER.* The micro doesn't bother that the same label has been used on both sides, it just updates *NUMBER* with its new value.

```
10 REM PROGRAM II
20 PRINT CHR$(125)
30 NUMBER=1
40 PRINT NUMBER
50 NUMBER=NUMBER+1
60 PRINT NUMBER
70 NUMBER=NUMBER+1
80 PRINT NUMBER
```

Program II

The practical effect of line 50 is to increase *NUMBER* by one – to two. Line 60 then duly prints out this new value of *NUMBER*.

Line 70 is identical to line 50. Starting at the right of the equals sign it takes the value of *NUMBER,* increases it by one, then re-labels it with *NUMBER.* That is, *NUMBER* increases from two to three. Line 80 then prints out the new value of *NUMBER.*

The thing to remember is that the equals sign doesn't mean *equals* – it means *assign.* You "do" what's on the right of the equals sign, and then assign the result to the label on the left.

Let's take this idea a little further. Have a look at Program III. The first five lines should be fairly familiar.

When we run it the screen clears, line 20, we set *NUMBER* equal to zero, line 30, increase it by one, line 40, and then print it, line 50. Since *NUMBER* was zero, and we've increased it by one, the result will be that 1 appears on the screen.

Once the program's done this, we come to line 60 which reads:

```
60 GOTO 40
```

As you'll recall, the GOTO 40 tells the micro to make line 40 the next line it does. This increases *NUMBER* by one, as we've seen, so *NUMBER* takes the value two. Line 50 then prints out the 2 and we encounter line 60 again.

This sends us back to line 40, which increases *NUMBER.* Line 50 prints out the new figure, 3, then we're back at line 60, which takes us to line 40, which increases *NUMBER,* and so on.

I think you can see that the program will produce the steadily

```
10 REM PROGRAM III
20 PRINT CHR$(125)
30 NUMBER=0
40 NUMBER=NUMBER+1
50 PRINT NUMBER
60 GOTO 40
```

Program III

increasing sequence of numbers 1, 2, 3, 4, 5, 6, 7 and so on.

Try running it and see. You'll probably be glad to know that the way to break out of the program is by the aptly named Break key.

If you simply want to freeze things for a moment while you examine the output, press the Control and the 1 (one) key at the same time – we write this as "press Control+1". To restart things simply press Control+1 again.

As we've mentioned, when a program keeps going round in circles like this, we call it a loop. We can then make statements such as *NUMBER increases by one each time round the loop.*

If you press Break, or freeze it quickly enough after the start of the program, you'll see that the first value of *NUMBER* printed out is one, and not zero as you might think. All right, we assigned zero to *NUMBER* in line 30, but we increased it by one immediately, before ever printing it out.

But what if we wanted the zero printing out? Well, a sneaky method would be to make line 30 of Program III:

```
30 NUMBER=-1
```

What happens here is that line 40 immediately increases *NUMBER* by one, to make it zero (–1 + 1 = 0). Line 50 then prints it out.

```
10 REM PROGRAM IV
20 PRINT CHR$(125)
30 NUMBER=0
40 PRINT NUMBER
50 NUMBER=NUMBER+1
60 GOTO 40
```

Program IV

Another way round is just to swap lines 40 and 50, so we PRINT before we increase *NUMBER*. This is what I've done in Program IV. Try running it and you'll see – if you're quick enough – that 0 does appear on your screen.

```
10 REM PROGRAM V
20 PRINT CHR$(125)
30 NUMBER=0
40 PRINT NUMBER
50 NUMBER=NUMBER+3
60 GOTO 40
```

Program V

Actually we don't need to go up in steps of one. Have a look at line 50 of Program V:

```
NUMBER = NUMBER + 3
```

Remembering that micros start on the right of the equals sign, the Atari takes the value labelled by *NUMBER*, adds three to it, and gives the result the label *NUMBER*. The effect is that line 50 increases the value of *NUMBER* by three each time round the loop, so numbers are printed out on our screen going up in steps of three.

Nor do the numbers always have to be getting larger. Program VI, as

```
10 REM PROGRAM VI
20 PRINT CHR$(125)
30 NUMBER=1000
40 PRINT NUMBER
50 NUMBER=NUMBER-1
60 GOTO 40
```

Program VI

you'll see without too much difficulty, starts at 1000, then prints out 999, 998, 997 and so on. The crux here is line 50:

```
50 NUMBER = NUMBER - 1
```

Try running it if you won't take my word for it!

In fact we can write a general program that will start at any number and go up or down in whatever steps we want by using the INPUT statement we met last month. Program VII does the trick.

First of all the program asks us the number we want to start printing from – which we label *START*. Notice how line 30 politely prints out a message to tell us what we're supposed to INPUT. Line 40 does the

```
10 REM PROGRAM VII
20 PRINT CHR$(125)
30 PRINT "Number to start at";
40 INPUT START
50 PRINT "Increment of";
60 INPUT INCREMENT
70 NUMBER=START
80 PRINT NUMBER
90 NUMBER=NUMBER+INCREMENT
100 GOTO 80
```

Program VII

actual INPUT, labelling it as *START*.

Lines 50 and 60 then prompt for, and INPUT the increment, or step, by which we want the numbers to go up, labelling it *INCREMENT*.

We then get down to business. Line 70 assigns the value of *START* to *NUMBER*. We then print this value of *NUMBER* in line 80, so we're off to a good start, if you'll pardon the pun.

We then have to increase *NUMBER* by the value of *INCREMENT* to get the next value. Line 100 then jumps back to 80, which then prints the updated value. Line 90 then increases it again by *INCREMENT* and so on.

If you have difficulty visualising this try substituting sets of real numbers for *START* and *INCREMENT* and see what happens as you go round the loop.

For instance, if you mentally input 25 for *START* and 5 for *INCREMENT*, line 70 would give *NUMBER* the value 25, which line 80 would then print out. Line 90 would then add 5 to this, giving *NUMBER* the value 30 then we'd loop back to 80 via 100. The figure 30 would then be printed out, line 90 would increase it by 5 again, and so on.

All well and good, but having to escape from these loops by pressing Break isn't very elegant is it? Ideally the program should stop of its own accord. In other words, we should give it a condition to finish on. The loops we've met so far haven't had any finishing condition so they're known as unconditional loops.

We need to create a conditional loop, and Program VIII shows us how we go about it.

```
10 REM PROGRAM VIII
20 PRINT CHR$(125)
30 ? "I'll keep on going
until you enter 999"
40 INPUT NUMBER
50 IF NUMBER=999 THEN STOP
60 GOTO 30
```

Program VIII

The idea is that we keep on looping round, printing out the same inane message, until we enter 999. That is, the condition for ending the loop is that we INPUT 999 – any other

→

number will cause the loop to be repeated.

Let's see how we achieve this: Line 20 clears the screen, then line 30 prompts for the INPUT, saying the program will keep on going until 999 is entered.

(In case you're wondering what the ? is in line 30, it's the Atari's abbreviation for PRINT. If you want to substitute ? for PRINT, then go ahead. I prefer the clarity spelling it out gives you.)

Line 40 then INPUTs into the variable *NUMBER*. Line 50 is the heart of the matter – this is where we *test for our condition.* It reads:

```
50 IF NUMBER=999 THEN STOP
```

This uses the IF . . . THEN statement, one we haven't met before. It reads:

IF some condition is TRUE, do what follows the THEN.
IF that condition isn't TRUE, ignore what's after the THEN and carry on with the next line.

In the case of line 50, this boils down to:

IF NUMBER does indeed equal 999 THEN STOP.
IF NUMBER isn't 999, THEN drop through to the next line – line 60 in this case.

So if when prompted by line 30, we'd INPUT a value of 999 for *NUMBER,* we would do what's after THEN and STOP.

We haven't met STOP before, but I don't think you'll be too surprised to learn that it stops the micro dead in its tracks. It also prints out a message indicating the line it was stopped at. In this case it would be STOPPED AT LINE 50.

If, however, we entered a value for *NUMBER* other than 999, our condition hasn't been met, so we carry on with the next line of the program, line 60, which then sends us back to our prompt for INPUT again.

In other words, the IF . . . THEN statement ensures that we keep on looping until we enter the number 999. We've got ourselves a conditional loop!

Actually there are other ways of stopping it, such as pressing Break or entering a word when it's expecting a number. For the moment we'll assume that you're good-mannered enough to avoid this. Later on we'll see how to "idiot proof" our input, as it's known.

Try running Program VIII, and enter 999 to stop it. Then enter:

```
CONT
```

The program will restart – CONT stands for continue. The same trick works after you've pressed Break.

The IF . . . THEN statement isn't too hard to use. just remember:

- The condition you're testing for comes directly after the IF.
- You can put any valid Basic instruction after the THEN.
- The instruction after the THEN is only carried out if the condition has been met – that is, if it's true.
- If the condition is not true, the micro ignores what's after the THEN and continues with the next line of the program.

' Smaller numbers at the sharp end . . . '

Take a look at Program IX now. This does exactly the same job as Program VIII but in a different way. This time we test to see if the number is NOT equal to 999, and, if this is so, we loop back to our prompt for INPUT. Lines 20 to 40 are identical. The vital bits are lines 50 and 60.

Line 50 reads:

```
50 IF NUMBER<>999 THEN GOTO 30
```

Here our condition is that

```
10 REM PROGRAM IX
20 PRINT CHR$(125)
30 ? "I'll keep on going
until you enter 999"
40 INPUT NUMBER
50 IF NUMBER<>999 THEN GOTO 30
60 END
```

Program IX

NUMBER isn't equal to 999. That's what < > means – not equal to. And if our condition's true – that is, *NUMBER* isn't equal to 999 – we THEN loop back to line 30.

On the other hand, if the condition in line 30 isn't met – that is *NUMBER* is 999 – we simply drop through to line 60, which reads:

```
60 END
```

We met this before. As its name suggests, it simply ends proceedings, this time without any message, unlike STOP.

The not equal to symbol, < >, may be new to you. It's just one of a set of inequalities, as they're known, that come in very useful in combination with IF . . . THEN statements. Table I summarises them.

If you're anything like me, you'll get confused between > and <. The trick is to remember that, for both symbols, the larger number goes opposite the bigger end of the symbol, whereas the smaller number goes opposite the sharp, or smaller, end. It may not be the way Einstein remembered it, but it's good enough for me!

Program X uses what we've learned about IF . . .THEN statements, as they're known, to add a finishing point to Program VII. Lines 10 to 40 are identical. We clear the

Inequality	**Meaning**	**Example**
=	equals	7=7 is true, 8=7 is false
>	greater than	7>5 is true, 3>4 is false
<	less than	3<4 is true, 7<7 is false
< >	not equal to	4< >5 is true, 4< >4 is false
>=	greater than or equal to	6>=5 is true, 6>=9 is false
<=	less than or equal to	7<=7 is true, 7<=6 is false

Table I: Inequalities

screen and INPUT a value for *START,* the number we start from.

Lines 50 and 60 then prompt for and INPUT the number we wish to end at, *FINISH.* 70 and 80 then INPUT *INCREMENT,* the value of our step. As in program VII, the value of *START* is assigned to *NUMBER,* line 90, and then printed, line 100. Next, we increase the value of *NUMBER* by *INCREMENT* and store it in *NUMBER* again at line 110.

Line 120 is the crux:

```
120 IF NUMBER>FINISH THEN END
```

What this says is, if we've incremented *NUMBER* past *FINISH* end the program here and now. If not, then continue with the next line, which will loop back to 100 and print the newly-incremented number.

Notice that if we have exceeded the limit we don't actually print that value of *NUMBER* since we don't loop back to the PRINT statement of line 100.

```
10 REM PROGRAM X
20 PRINT CHR$(125)
30 PRINT "Number to start at";
40 INPUT START
50 PRINT "Number to finish at";
60 INPUT FINISH
70 PRINT "Increment of";
80 INPUT INCREMENT
90 NUMBER=START
100 PRINT NUMBER
110 NUMBER=NUMBER+INCREMENT
120 IF NUMBER>FINISH THEN END
130 GOTO 100
```

Program X

Experiment with different values for *START, FINISH* and *INCREMENT* and see if you can understand what's happening. This program is quite fundamental, and we'll be using its ideas a lot, so it's worth an effort.

For instance, if you start at 25, set the finish to 35 and prescribe a step of 5, you'll get:

25
30
35

on your screen.

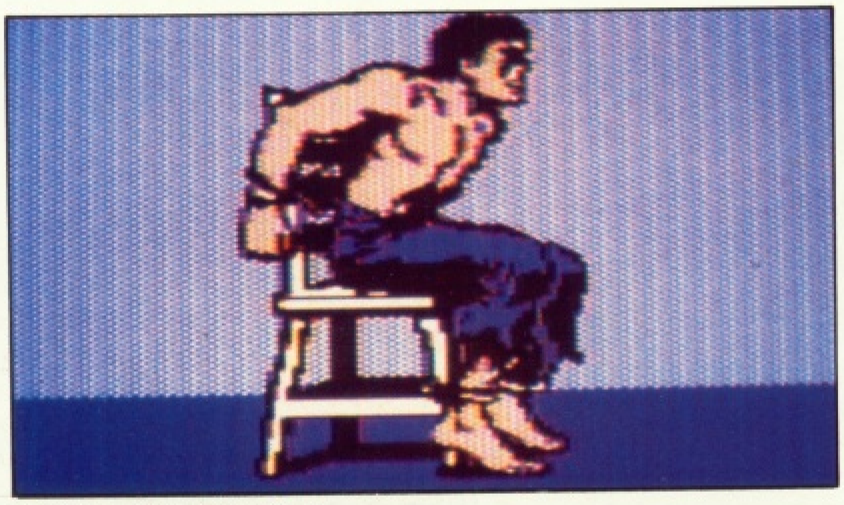
However a start of 50 and a finish of 55 with an increment of 3 will result in:

50
53

You won't see a 56, because it exceeds our limit.

What happens if the start and finish numbers are the same, or the increment is negative? In fact, will the program work with negative numbers? And what would happen if we choose an increment of zero? Find out!

● *Well that's all for this month. Next month we'll be continuing with loops, but in an entirely different way.*



Bruce Banner in a tight spot



The transformation from Hulk to Bruce

Setting the standard for adventure graphics

BRILLIG takes a first look at adventures inspired by those Marvel comic heroes

AS promised last month, let's take a look at the Scott Adams Quest Probe series. Unfortunately, The Fantastic Four – next in the series of Marvel Super Heroes to be put into adventure form – has not yet arrived from Adventure International so I shall only be able to look at the first two games of the series, The Incredible Hulk and Spiderman.

The Quest Probe series is Scott Adams' first major venture into graphics from the off, although his earlier games have had graphics added in some cases. Hence the games are available either as text only cassettes or on disc with graphics, with a commensurate price difference.

The graphic versions also contain a "graphics off" command for any text fans who prefer the faster loading of discs.

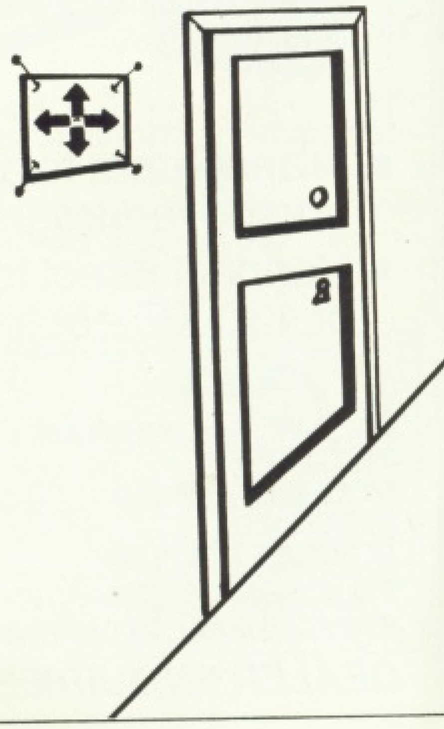
Now I have in earlier columns expressed my views on what graphics add to and subtract from a game. In the case of Quest Probe I have to say that the graphics do add to the game for two main reasons.

Firstly the characters portrayed are cartoon characters in their own right. Hence the impression given in the games is an entirely accurate one, and nothing jars with the players' perception of the central figure. This is reinforced by the inclusion of an actual Marvel comic in the package, designed to introduce the characters to newcomers.

Secondly the text in the games tends to be fairly sparse and a little repetitive, presumably a reflection on the amount of memory taken up by the graphics. For instance, in The Hulk most of the action takes place in or around a series of large domes, while in Spiderman the action takes place in a large office building.

The graphics themselves, particularly in The Hulk, are the best I have seen in any Atari adventure, giving an excellent representation of the original cartoon characters. If graphic adventures are to be the way forward then this is the standard to beat for any new contenders.

The games have a slightly disappointing quality, in that the actual story line behind each is similar, as you send your Super Hero on a gem-collecting mission. I feel that with a little more imagination and variety the characters could have been set some slightly more challeng-



'What you need is a point of reference'

ing tasks to tax their amazing powers.

The Quest Probe series to date provides some good challenging hunt-and-find problems and as this is an interconnected series it will presumably follow the same pattern in the Fantastic Four. Worth buying for the graphics for sure, and any Scott Adams adventure is worth a look, but the text only versions are a little on the dry side.

Now on to some of the nitty gritty adventuring problems. Picture the scene. There you are strolling contentedly through your adventure, a nice full inventory, when suddenly everything looks the same. No matter which exit you take your surroundings never vary. In short you have hit what every adventurer dreads – a maze.

This is the sort of problem that is going to confront you in probably seven games out of ten, so we had better make sure that there is a way of dealing with it.

Richard Burke, of Gwent, has come up against just such a problem in **Escape from Pulsar 7,** written by Brian Howarth as one of the Mysterious Adventures now marketed by Adventure International.

Richard's problem is that he cannot open the locker in the storeroom, or indeed always find the storeroom. The storeroom in Pulsar 7 forms part of a double maze in the game.

The first part of the maze is that several rooms are exits from a series of air ducts. The second part, in common with several of the other Mysterious Adventures, is the total lack of geographical logic in the game.

In adventures today there is absolutely no excuse for an exit leading north to a location and yet the south exit from that new location leading somewhere completely different. This is the case in Pulsar 7, and probably explains why Richard cannot always find the storeroom.

The Brillig patent maze mapping method can, however, solve the problems caused by encountering games writers with no sense of direction. The first sign of a maze is when, despite the plethora of exits in many directions, the player cannot appear to move. The location description remains the same. But has the location?

The problem is that you cannot tell. Everything looks the same. What you need is a point of reference, so start with where you are and call that No 1.

All you have to do is drop an item from the inventory, such as a pencil, to identify location No 1. Now go through the available exits, and every time you can still see the pencil you have dropped, mark a dot against that exit. It obviously leads nowhere.

If you cannot see the pencil, then you have moved, so drop another item and repeat the process. Continue this until you have mapped the whole maze, and from then on it will be a piece of cake to pick your way through it.

In the case of Pulsar 7 I suggest you name each location after the inventory item you drop, as the geography of the maze is pure nonsense. But by persistence with my method I can promise Richard will find something that will be a smash hit with that locker.

Mind you, some adventure writers have got smart to this system, so don't be too surprised if your mapping items start disappearing while you are away.

Jymm Pearson's **Curse of Crowley Manor** is the Other Venture causing James Chapman problems, being stuck in the numerical lock room with a monstrous creature. Well, James, follow Rule Number One and examine everything in an adventure, including your transportation to the manor, and you may find some useful liquid refreshment.

Finally a letter from M. Woodgate asks me to commit an act of heresy and recommend a good disc adventure that is not from Infocom.

I see from his letter that he already has Atari's **The Pay-Off** and that he is considering **Mask of the Sun** by Broderbund – which is no bad choice.

Can I also suggest the Ultima series (I to IV) if a graphic adventure is what he is after. They should keep him busy for a few months.

Since Adventure International has featured as the bulk of this article Steve Calkin, of Pitsea, wins an *Atari User* T shirt for his "Glitch of the



If you map a maze by dropping an object at every location it will be a piece of cake to pick your way through

Month" recounted to him by none other than Scott Adams at last year's PCW show.

Adventureland has an obstinate bear to pass. Shou(t) or Scre(am) Bear will work. Now try replacing "am" with "w" as one frustrated American did.

No wonder the bear was surprised.

TAKE ONE LARGE HOD...

THOSE of you who solved last month's Bricks puzzle will know that you needed rather a large hod.

The program we present here provides a means of arriving at answers to the questions: (a) How many bricks did you drop? and (b) How many E/W moves did you make?

The rooms are in the array R, with P as the pointer to the current room. There are a generous 700 rooms and P starts in room 20.

The data correspond to the cards described last month. Each set of three numbers provides the instructions to:

- Drop a brick or clear the room – drop 5 or 0 in R(P).
- Move East or West – add 1 or −1 to P.
- Get the next three data items and count moves.

Reaching the equivalent of the STOP causes the array C to exceed its bounds and so the TRAP command causes the value of I – the number of moves – to be printed out. The array R is then searched for 5s, the number of these corresponding to the number of bricks dropped.

If you run the program you should get answers of 134,468 moves and 501 bricks. Be warned though, Atari Basic is so slow that the program takes about an hour to run.

```
10 DIM R(700),D(9),M(9),C(9)
20 FOR I=0 TO 700:R(I)=0:NEXT I
30 FOR I=0 TO 9:D(I)=0:M(I)=0:C(I)=0:N
EXT I
40 FOR I=0 TO 9
50 READ X,Y,Z
60 D(I)=X:M(I)=Y:C(I)=Z
70 NEXT I
80 DATA 5,1,1,5,1,2,5,-1,0,5,-1,2,0,1,
3
90 DATA 0,-1,2,5,1,4,0,1,1,5,1,0,5,0,5
100 P=20:N=0
110 TRAP 150
120 FOR I=1 TO 3000000
130 R(P)=D(N):P=P+M(N):N=R(P)+C(N)
140 NEXT I
150 PRINT I
160 BRICKS=0
170 FOR J=0 TO 700
180 IF R(J)=5 THEN BRICKS=BRICKS+1
190 NEXT J
200 PRINT "BRICKS= ";BRICKS
```

Sparkling arcade game is fast – and fun...

ONE of the classic arcade games, often emulated but never in my opinion surpassed, is **Boulderdash.**

The concept is simplicity itself. You control Rockford, a handy little mole who whizzes through the boulder-riddled sub soil collecting diamonds as fast as his little paws will carry him.

Collect enough diamonds and a door opens up. Reach the door to the transported to the next level up, and start again in a different cave.

In practice it isn't that simple – is it ever? – as there is a stringent time limit with a really off-putting, panic-inducing 10 second countdown.

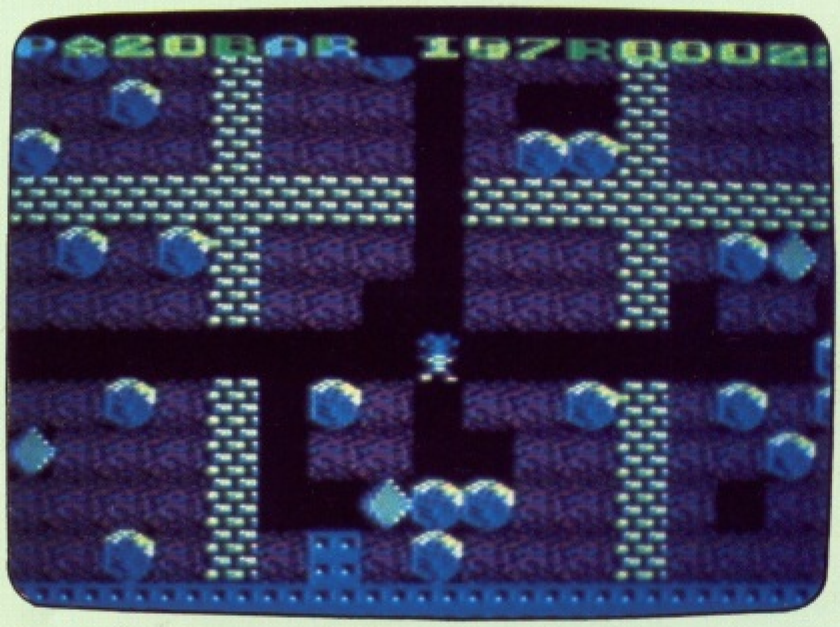
Rockford is well aware of this, as any pause in the action leaves him frowning and tapping his foot impatiently.

This is quite apart from the fact that the more subsoil you remove the more Rockford is likely to receive a boulder on his head as he strives for the next gem.

The caves themselves are of varying degrees of difficulty, from not too easy to downright impossible.

Cave A lets you zoom around and acclimatise to the perils of the plummeting boulders you inadvertently induce. Cave B does more of the same, while Cave C wiped me out for about a fortnight as I struggled to clear all 24 diamonds and find the exit in time.

Expert boulderdashers have shown me that there is a technique to every screen, although to assist the unworthy there is a facility to flip forward four caves at a time, or a pause button to allow you to plan your route through the earth.



Trapping Butterflies which turn into diamonds when you casually drop a rock on their heads is a theme in several caves, together with flooding them and avoiding nasty little "warps" set to chase you around the screen.

The whole game is tremendous pacey fun and an absolute must for any Atari owner. And if this doesn't leave you exhausted Boulderdash II is coming. Buy it!

Pete Sleeman

HIJACK'S ALL RIGHT, JACK!

IT'S a good job English Software released **Hijack** before the Shi'ite Muslims decided to play the game for real. Otherwise they might have laid themselves open to charges of opportunism.

As it is, the worst one could level against them is a charge of premeditated plagiarism.

If you ever saw Broderbund's Choplifter, then Hijack will give you a remarkable feeling of déjà vu.

The innovative aspect of the scenario is that it is a train that has been hijacked.

"Fly this train to Waterloo" doesn't sound quite right, does it?

There are 10 VIPs aboard the train and your job as a chopper pilot is to pick them off the roof of the train and deposit them in the safety of the rear carriage. Meanwhile, of course, there are hazards to be avoided.

Guns fire at you and trees suddenly offer themselves as targets for you to crash into. It's like learning to drive all over again!

The title page is accompanied by a jolly rendition of The Runaway Train, but the game sounds consist largely of the tacka-tacka-tacka helicopter rotor and whizz-boom gunshots.



One nice feature is that following a wipe-out you can start from the level you were on when killed. You can also restart from the beginning if you really want to.

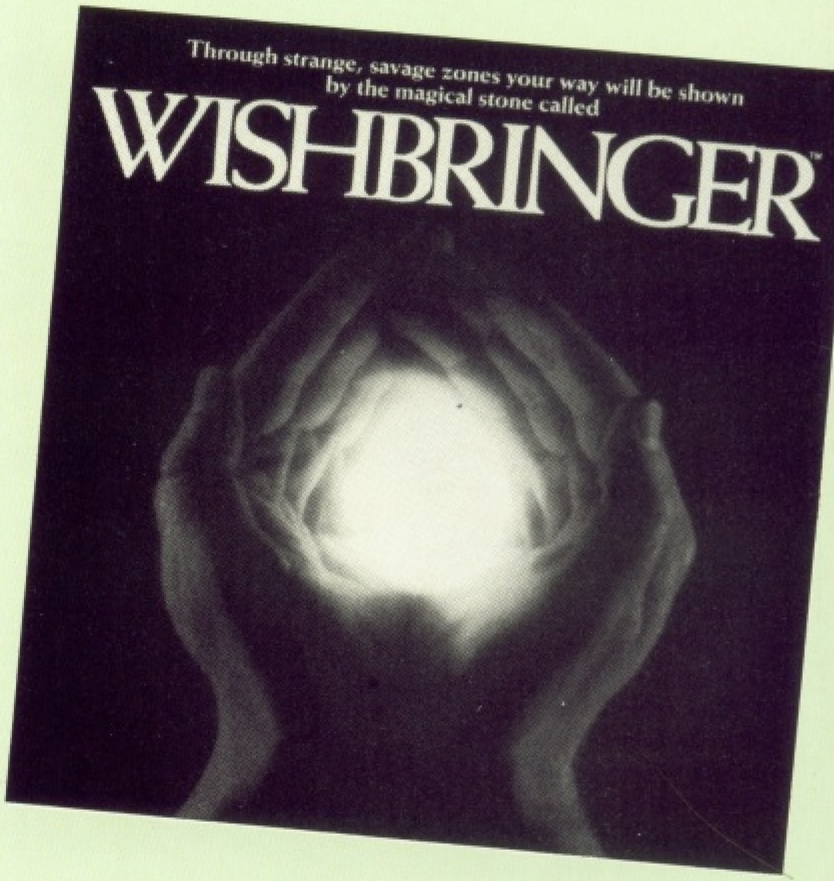
It's not one of the most compulsive games I've ever played. In fact in my opinion the cleverest part is the way the title is written in an appropriate shape on the cassette inlay.

It's a lot more colourful than Choplifter, and if you never saw Broderbund's classic you may well love Hijack. For my money, though, I prefer the original.

Talking of money, the 48k cassette costs £7.95 and the disc version is £10.95.

Dave Russell

Magick moments in Festeron



ONCE upon a time there was a nasty Queen who, as the law governing fairy stories dictates, had a beautiful and virtuous stepdaughter.

Now the Queen, being the crabby, cantankerous and malicious monarch that she was, decreed that no one should marry the fair Princess Morning Star until they first proved themselves worthy.

Naturally Queenie devised tests that would ensure that none of the macho knights that sought the Princess's hand would live to tell the tale. One besotted wretch was even sent deep into the Mines of Mendon, there to slay a Grue and drag the carcass up where all might see it.

Now any Infocom adventurer worth his or her salt could have told the poor sucker that he'd have been better off staying at home reading a good magazine like Atari User but no – off he went. Darkness soon overcame the hapless knight who, lost without a lamp, was soon devoured by a lurking Grue.

Since nobody ever survived the ordeals, the Princess was condemned to a life of loneliness and died without ever seeing a single knight make it to the finals.

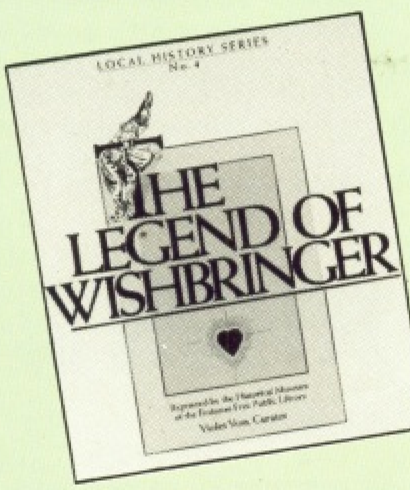
Many kingdoms later, a scholar happened to be rummaging through the ruined tombs of monarchs and chanced across a glowing object amid the dust and decrepitude.

It was the Princess' heart, now long since turned to stone but shining brightly with the unfulfilled wishes of a lifetime. And that, dear reader, was how the Magick Stone of Dreams was discovered.

In **Wishbringer,** from Infocom, you begin not as a knight in shining armour but as a humble Post Office worker. The game begins atop a hillside in the coastal town of Festeron.

You may wish to explore the town before or after going to the post office – the cinema, cemetery, police station, lighthouse, pleasure wharf, park, library and church are well worth a visit.

Your boss, Mr Crisp, is not



the most pleasant of postmasters – when you first meet him, he's reading other people's postcards – and will tell you in no uncertain terms what he thinks of you.

Your first job is to deliver a letter to the proprietor of Ye Olde Magick Shoppe, way up on a cliff top on the other side of town. You can't afford to hang about too long – the Magick Shoppe shuts at 5pm and the game starts at 3pm.

Getting there can present a problem. The bane of all messengers in the shape of a vicious poodle blocks the main route, and even if you do manage to pacify it the Pooch doesn't stay tranquil for long.

Once at the Magick Shoppe an old lady who is as fragile-looking and pale "as a faded signature in an antique book" receives your delivered letter.

She is clearly upset when she sees the writing on the envelope: "It has been a long, long time since I last saw this handwriting. Hoped I never would again".

The letter turns out to be a ransom note. Somebody signing themself as the Evil One has kidnapped the old lady's cat and wants the Magick Stone in return.

The lady is evidently distressed. In a voice breaking with emotion, she whispers "Many seek to gain the Stone of Dreams yet few can imagine the price. For years I have fought to conceal it from the Evil One and others like her.

"My youth, my home and family all were forfeited for its protection. And now, now it



claims my only companion".

Guess who's about to be entrusted with the Stone and the task of rescuing Chaos the cat? Right first time!

Before you know it, you're thrust out of the shop and into thick fog. When you peer through it, all you can see is the summit of Post Office hill. Only trouble is, there's now a massive tower where the Post Office used to be.

If you make it through the fog without falling to your death off the cliff, you'll find the whole scene has changed. Where birds once sang, vultures now croak. Trolls lurk. Your beloved town now seems to be in the grip of decay and despair.

And if you thought a nip on the trouser seat from a poodle was bad enough, what are you going to think about being chewed up by the enormous hellhound which has usurped the poodle's position?

Fortunately, the Magick Stone – Wishbringer – can help. With it, you can wish for advice, darkness, flight, freedom, luck, foresight and rain. You can only wish once for each, so must choose the occasion with care.

You must also have certain objects in order to make the wish effective. For example, and most appropriately, to wish for darkness you must first have drunk some Grue's milk.

Wishbringer is ranked as an introductory level adventure – the other Infocom gradings in order of difficulty are standard, advanced and expert – which means it is more suitable for the apprentice adventurer. Nevertheless, even seasoned adventurers will find it a joy to play.

The package comes handsomely boxed with glossy manual, map and your very own Wishbringer stone.

Wishbringer is not intended as the sequel to the marvellous Sorcerer and Enchanter as some people thought it might be – that pleasure is still to come.

Yet once again Infocom has come up trumps. Wishbringer is filled with humour, excitement, detail and atmosphere.

It maintains its high standards and keeps Infocom in pole position as the best adventure publishers in the world. Definitely not to be missed.

Bob Chappell



Some of the best at a fraction of the price

I'VE got some good news and some bad news.

First the bad news. If, like me, you were one of the first to spend your hard-earned cash on an old 800, then you might be forgiven for thinking that you had some terrible personal problem when it came to buying cheap quality software.

But this is where the good news comes in. Now, thanks to a few enterprising software dealers and the growing potential of our own software writers, we can at last enjoy some of the best Atari software at a portion of the price.

Archon by Electronic Arts, is one of these classics to filter through. It's distributed in the UK by Ariolasoft and costs £11.95 tape or £14.95 disc. It is at first glance similar to chess, not only in its board layout but in the movements of some of its players.

But that is where the similarity ends.

Archon is a two-screen game. The main screen is a chequered board, of light and dark squares.

There are also squares which vary between light and dark, but most important there are the power points – five squares which, if totally controlled by one side, will end the game.

The second screen is the scene of fierce battles to decide the right to own a square.

So much for the layout. Now on with the game itself.

Archon can either be a one or two player game.

You are given the choice of being either the light force or the dark force – and this is where the squares matter.

If you are the light side, the light squares will give you more strength than the dark squares and vice versa for the dark side.

The revolving squares will give a different amount of strength depending on your colour and its colour.

Each side has an army of equal strength but different in their fighting styles. Thus tactics play a major part in Archon.

The most important element is the Wizard who can cast spells ranging from healing your player to reviving a dead piece.

This usually encourages an onslaught on the Wizard from the word go, but it can prove a very costly attack and is generally not preferred by the more experienced player.

My only complaint about this excellent game is that you do not have any skill-level selection in the one-player mode so I found myself beating the computer time after time.

The manual is well laid out giving hints on playing the game and a thorough explanation of your spell-casting ability.

The one I received was a Commodore 64 version which was accompanied by a photocopy of the Atari key functions.

I find this a touch strange as Archon was released first on the Atari, then on the 64. Perhaps this was a pre-release version of the manual.

All in all an original game, well written and a pleasure to play.

Paul Irvine

● *The review of M.U.L.E in the July issue was also by Paul Irvine and we're sorry we only managed to get 60 per cent of his name right!*

Hi-res graphics in modes 4 and 6

Part Five of DAVE RUSSELL's introduction to Atari graphics

WE looked last month at Modes 3, 5 and 7 and saw how they were four-colour modes. This month we'll take a look at the modes we missed out, 4 and 6.

These are still "map" modes, but they only allow two colours to be used. If you're wondering why anyone should want to limit themselves to two colours, the answer is memory. By way of a slight digression, let's see why this should be so.

We talk about a bit of information and because the word bit is used in everyday language it's easy to forget that it has a precise meaning in this context.

When someone offers you some more food and you say "Well, maybe just a bit more, please", you're using the word in a very imprecise way.

In information processing terms, bit is a contraction of the two words binary digit. We say that one bit of information has been transmitted if the number of possible outcomes has been halved.

Suppose I toss a coin and tell you that the outcome is heads. I've given you one bit of information because I've reduced the possibilities from two to one. Before I transmitted any information, the outcome could have been heads or tails.

Suppose your task is to guess which square on an otherwise empty chess-board contains a pawn. If I tell you that it isn't in the left-hand half of the board, once again I've given you one bit of information.

In the case of the chess board I've reduced the possibilities from 64 to 32. With the coin I reduced the possibilities from two to one. In both cases I have provided the same amount of information – one bit.

If you've been following Mike Bibby's Bit Wise series, you'll be quite familiar with binary notation, so let's work our way back towards the graphics screen.

If you think about a simple black-and-white screen, each pixel can either be white – lit – or black – unlit. That is, we can describe the pixel's state using only one binary digit. Let's say 1 represents lit and 0 represents unlit.

We could now describe a complete screen as a string of 1s and 0s and we could store this information in memory.

Suppose now we have the option of each pixel not only being lit but being coloured red. That is, each pixel can be lit or unlit, and if lit can be white or red.

Our single binary digit can't convey all this information, so we need to introduce another one. We could then describe each pixel's state as 00 – unlit, 01 – white lit – or 11 – red lit. There is another possible combination, 10 – red unlit – but in this case it doesn't make much sense.

It's easy to see that if we wanted to describe a screen containing this much information we'd need a bigger string of 1s and 0s. If even more colours were possible, we'd need an even bigger string.

This information is held in the micro's RAM memory and so we can see that if we want more colours available we have to allocate more memory to hold the possible colour information.

The other variable in the equation is the size of the pixel or the resolution. A high resolution screen has many pixels per row of screen and therefore needs more information-holding space than a low resolution screen.

Mode 4 has the same resolution as Mode 5 – 40 rows × 80 columns plus a text window. However because only two colours are available in Mode 4, it takes up less memory than Mode 5.

Similarly Mode 6 has the same resolution as Mode 7 – 80 rows × 160 columns plus text window – but again with only two available colours.

We can do much the same as we did in Modes 3, 5 and 7. For example, type GR.4 and the screen should clear to black with the blue text window at the bottom.

If you now enter:

COLOR 1: PLOT 5,5

you'll see our old friend the orange

square. To give us a bit more to look at, enter:

DRAWTO 30,9.

The colour of the plotted point defaults to orange but we can alter it by setting register 0. If you enter:

SETCOLOR 0,7,4

you alter register 0 to colour 7, luminance 4 and the orange blocks change to a nice deep blue.

The colour information for the background is held in register 4, so if you type:

SETCOLOR 4,5,6

the black should change into a purple – colour 5 – with luminance 6.

The colours for the plotted points and the background are the two colours. We could also change the colour of the text window via register 2. Try:

SETCOLOR 2,12,4

for example. You should now have blue blocks, purple background and green text window – revolting, isn't it?

Blue, purple, green . . . that's *three* colours. However, we haven't discovered an undocumented aspect of Mode 4. We've cheated by counting the colour of the text window which is really a bit of Mode 0. If we used a full-screen Mode 4, the text window would disappear and we'd be back to two colours.

If we specify COLOR 2 for the plotted points, we plot them in the background colour. If there's nothing already on the screen we wouldn't see any effect of this. However, one way to erase part of a display is to re-plot it in the background colour.

For example, try entering:

COLOR 2: PLOT 5,5: DRAWTO 30,9

and the line should disappear.

In addition to PLOTting, we can still PRINT#6 as we did in Mode 5. For example, enter:

POSITION 20,20: PRINT #6;"111110000011111"

and you should see lines appear where the 1s are printed and a space in between them where the 0s are.

If you're looking for ways of saving memory, it's worth noting that using PRINT #6 is generally more economical than PLOTting pairs of data points. This means that a combination of Mode 4 and PRINT #6 can be a very economical way of producing a display.

Although *we* can see the display simply by looking, there are times when your program needs to "see" the display. That is, it needs to know whether a particular screen location contains anything.

For example, you may be bouncing a ball around the screen and need to know if it has hit a wall.

Atari Basic provides a graphics command which will look at a screen location and say what is there. The command is LOCATE and the form it takes is:

LOCATE X,Y,Z

where X and Y are the coordinates of the screen location and the contents of the location are stored in Z.

If you press Reset and enter GR.4 to get back to a clear Mode 4 screen, then enter:

COLOR 1: PLOT 40,20

you'll once again be confronted by an orange square. If you now type:

LOCATE 40,20,Z: PRINT Z

the number 1 should be printed in the text window.

If you now enter:

LOCATE 40,19,Z: PRINT Z

the number 0 should appear in the text window. In the first case, the 1 signified that location 40,20 contained a coloured pixel whereas the 0 in the second case signified an unlit pixel.

You can use the information gained from looking at the screen to determine what happens next in your program. For example, if your ball has hit a wall, you must change its direction to simulate a bounce.

For example, enter:

LOCATE 40,20,Z: IF Z=1 THEN SETCOLOR 4,5,6

and see the effect. Because we plotted a point at 40,20 the LOCATE command assigned a value of 1 to the variable Z. The IF Z=1 test returns a value of "true" so the THEN part of the command is carried out. In this case the colour in register 4 is altered and the background once again becomes purple.

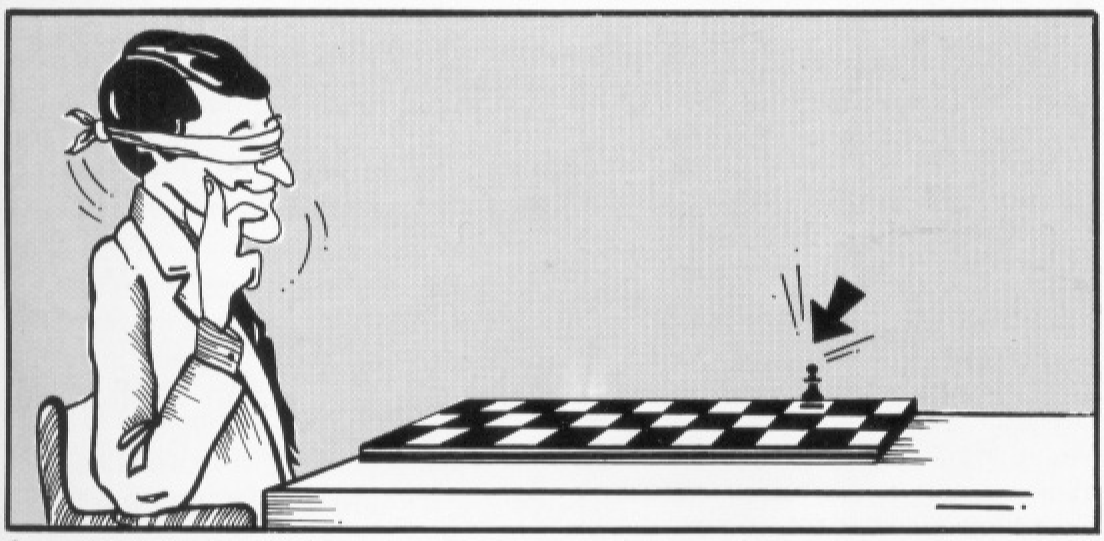
The LOCATE command is very useful but behaves slightly differently depending on which mode you've selected. If you're in Modes 0,1 or 2 the LOCATE returns a value between 0 and 255.

If you've selected Modes 3, 5 or 7 then LOCATE will return a value of 0, 1, 2 or 3. As we've just seen, in Modes 4 and 6 the LOCATE command returns either 0 or 1.

If you recall the earlier articles in this series, you've probably worked out the correspondence between the characteristics of the mode and the values that LOCATE returns.

Even so, I suggest you try out the LOCATE command in all the graphics modes that we've covered so far and get familiar with its results.

● *That's your homework for this month – next month we'll look at Mode 8.*



Guess the square the pawn is on – just one bit of information is a help . . .

ROLAND WADDILOVE goes down the road that leads to artificial intelligence with this program that modifies itself

DATA MAKER

THE assembler published in the August issue of *Atari User* is a very useful tool for developing short machine code routines. If you've been using it, you might well be asking: How can these routines be incorporated in a Basic program?

The best way would be to store the machine code in data statements in the program. Then a simple routine could be used to read each item and store it in memory.

The problem with this method is how to get the code into the data statements. It would be very tedious to do it yourself . . . surely there must be an easier way?

Well, there is. Just ask your Atari to do it for you!

Data Maker was designed to take any section of memory and to convert it into data statements. All you have to do is tell it where to start and how many bytes to convert.

The program constructs all the data statements and types them in for you. It then deletes itself, leaving just the lines of data.

Quite a clever technique is used by the program and it's worth studying.

What the program does is to clear the screen and print a line number followed by "DATA". This is carried out in line 70.

It then Peeks the memory and gets 20 bytes of data. These are printed with commas between by lines 80 to 110. Finally, it prints:

```
GOTO 130
```

The next line, 120 is the most important line. It Pokes memory location 842 with 13 and ends the program.

What this does is to put the Atari editor into input mode when the program ends. It's as if you had just pressed Return when entering a line. Anything printed on that line is entered.

The clever part is positioning the cursor just before the program ends so that it lands on the line of data that it just printed. It then enters it as if you had typed it in. The cursor is then moved on to the next line.

```
10 REM ***** Data Maker *****
20 REM *** (c) Atari User ***
30 GRAPHICS 0
40 ? :? "Atari Data Maker...":? :? "Li
ne number...";:INPUT L
50 ? :? "Start address...";:INPUT A
60 ? :? "How many bytes...";:INPUT B:B
=B+A
70 ? CHR$(125):POSITION 2,2:? L;"DATA
";:L=L+10
80 FOR I=1 TO 19
90 ? PEEK(A);",";:A=A+1
100 NEXT I
110 ? PEEK(A):? "GOTO 130"
120 POSITION 0,0:POKE 842,13:END
130 IF A<B THEN A=A+1:GOTO 70
140 POKE 842,12:? CHR$(125)
150 POSITION 2,2:FOR I=10 TO 160 STEP
10:? I:NEXT I:? "POKE 842,12"
160 POSITION 0,0:POKE 842,13:END
```

Program I

It's still in input mode remember, so it enters:

```
GOTO 130
```

which it does. This line sends it back to line 70 to print another data statement if it hasn't finished. When it's done this, it stops, enters it and goes round again.

When it's entered all the data, it goes on to line 140 which puts it back into normal keyboard mode. All the line numbers used by the data maker itself are printed on the screen followed by:

```
POKE 842,12
```

in line 150.

Again the cursor is positioned and the editor put into input mode.

The program ends, at which point the editor takes over and enters all the line numbers, deleting the program itself.

Finally it enters the poke which sets the editor back to normal keyboard mode. All that remains are the data statements.

As you can see, it's a powerful technique that's worth mastering.

I find programs that modify themselves quite interesting and there must be many other applications of this clever trick.

How about an artificial intelligence program? It could grow like a living creature, building up its data as it learned . . .

Part III of MIKE ROWE's series on how to give your program displays the professional touch

It's not at all rude to interrupt...

AN interrupt, in computer terms, is when the computer temporarily stops executing the main program – Basic, machine code or any other language – and executes another program in memory before returning to the original program.

There are several types of interrupt which are useful for different functions, and they can be divided into two types.

NMI – non-maskable interrupts – cannot be disabled by the 6502 processor and include vertical blank interrupts – VBI – display list interrupts – DLI – and Reset.

The VBI occurs during the screen blank after drawing one screen and before starting the next. These occur every 50th of a second.

A DLI can occur after each line is drawn on the screen and takes place in the small delay between drawing each line on the screen.

The other type of interrupts are called IRQ – interrupt request. These are maskable, which means they can be disabled by the 6502 processor.

These are several timer interrupts, peripheral and serial bus input/output interrupts, the Break key and 6502 Break instructions.

NMIs are handled by the Antic chip while IRQs are handled by the Pokey and PIA chips.

But we are only interested in DLIs for now. A DLI can occur every time a line is drawn on the screen. Therefore, because it enables you to have a small program running each time a DLI occurs, it means you can change various parameters as the screen is drawn.

The result of this is that you can change, for example, the colour of any of the registers part way down the screen once or many times.

This allows many more colours to be displayed at once. Other possible uses are to change the character set in use part way down, change sound or music, move players or split players several times, fine scrolling in different directions – such as in Frogger – and differing screen widths. Any of these without interfering with



your main program at all.

All this sounds too good to be true and there has to be a drawback. Well, if you are purely a Basic programmer there is. The interrupts must be in machine code.

However, don't panic. There is no reason why you cannot use DLI routines from other sources in your own program because using them is very easy.

Let's begin by looking at the routine itself, should you decide to try writing your own. The first point is that timing is critical. Only a relatively short amount of time is available in a DLI, so the routine must be short.

It must start by storing any registers it uses – A, X and Y – on the stack, as the main program will require these back after the interrupt, and it must restore them at the end of the routine.

Also note that many locations for colour or other functions have two locations, the hardware register and the shadow register. In these cases you would normally POKE to the shadow register and the OS transfers the number to the hardware register during the vertical blank.

Any registers changed by the routine should be the hardware registers, not the shadow registers used from Basic.

For example, to change the background colour in Basic you would POKE 712 with a number. This is the shadow of the hardware colour register for the background – 53274.

However if you POKEd directly to this the operating system would reset it to the value in 712 during the VBI.

This can be used to your advantage in that any colour change in a DLI will be reset to normal each time the screen is redrawn, thus keeping the change just below the DLI.

Any colour change on a line will not occur in a constant position on that line. This can be overcome by storing the value in WSYNC – 54282

Don't panic, but the interrupts must be in machine code

– before the colour register. This delays the interrupt until the end of the line making a neat boundary.

The best way to write your own DLI is to examine the ones in the examples in this article first.

Having got your DLI routine – written or borrowed – it is used as follows. First modify the display list. This involves changing each display list line where the DLI is required by setting bit 7. In other words add 128 – $80 – to the line. This can be a single line or several lines.

Next POKE 512 and 513 – $200,$201 – with the low and high byte values of the location of the DLI machine code routine.

For example, Page 6 is 1536. Here machine code is safe from Basic and most other operations. POKE in the code from 1536 and POKE 512 and 513 with 0 and 6 respectively – 6*256+0=1536. Finally POKE 54286 with 192 to enable the DLI to occur.

Note there is only one address for DLI routines and if more than one is to be used then the interrupts must change the address as each is executed.

If this seems complicated, it isn't really, as the following examples show.

First you can change colours part way down the screen. Program I changes the background colour half →

```
10 REM DLI EXAMPLE 1
20 REM by Mike Rowe
100 GRAPHICS 2
110 DL=PEEK(560)+PEEK(561)*256:REM FIND START OF DISPLAY LIST
120 POKE DL+10,6+128:REM TELL ANTIC WHERE TO EXECUTE THE INTERRUPT
130 POSITION 4,2:? #6;"DISPLAY LIST"
140 POSITION 6,4:? #6;"interrupt":REM interrupt IN INVERSE
150 POSITION 6,7:? #6;"example"
160 POSITION 9,9:? #6;"[illegible]":REM INVERSE
200 FOR I=0 TO 10:READ A:POKE 1536+I,A:NEXT I:REM READ MACHINE CODE INTO PAGE 6
210 DATA 72,169,22,141,10,212,141,26,208,104,64
220 POKE 512,0:POKE 513,6:REM TELL OS THE ADDRESS OF YOUR MACHINE CODE
230 POKE 54286,192:REM ENABLE DLI
```

Program I

way down a Graphics 2 screen. Note that more than one colour register could have been changed.

The machine code for the DLI in this program disassembles as shown in Figure I. This shows a single change of colour. The colour can be changed several times down the screen.

In Program II we increase the colour of the foreground by 4 on each line to produce a multicoloured design.

The next step from this is to make the colours rotate. Program III produces a gradual change in colour rotating up the screen as seen in numerous Atari demos.

Spectacular isn't it? And so easy.

Graphics 0 is rather plain and boring normally. By using a DLI on each line a spectacular multicolour – 48-colour – Graphics 0 screen can be made as in Program IV. You can alter the colours by changing the Data statements in lines 210 and 230.

Decimal	Hex	Disassembly	
72	$48	PHA	;Save accumulator on to stack
169,22	$A9,16	LDA $16	;Load accumulator with change in colour
141,10,212	$8D,0A,D4	STA $D40A	;Store in WSYNC
141,26,208	$8D,1A,D0	STA $D01A	;Store in background hardware register
104	$68	PLA	;Restore accumulator value
64	$40	TIR	;Return from interrupt

Figure I: Disassembly of DLI

```
10 REM DLI EXAMPLE 2
20 REM by Mike Rowe
100 DATA 72,173,197,2,24,105,4
110 DATA 141,10,212,141,197,2,141,23,2
08,104,64
120 FOR I=1536 TO 1553:READ A:POKE I,A
:NEXT I:REM READ MACHINE CODE INTO PAG
E 6
199 REM DRAW DESIGN
200 GRAPHICS 7:SETCOLOR 2,0,0
210 COLOR 2
220 PLOT 80,65:DRAWTO 50,20:DRAWTO 110
,20:DRAWTO 80,65:POKE 765,2:POSITION 5
0,20:XIO 18,#6,0,0,"S:"
230 PLOT 80,10:DRAWTO 50,55:DRAWTO 110
,55:DRAWTO 80,10:POSITION 50,55:XIO 18
,#6,0,0,"S:"
240 FOR I=10 TO 55:PLOT 110,55:DRAWTO
80,I:NEXT I
245 FOR I=1 TO 100:PLOT RND(0)*159,RND
(0)*79:NEXT I
250 DL=PEEK(560)+PEEK(561)*256:REM FIN
D START OF DISPLAY LIST
260 FOR I=DL+6 TO DL+69:POKE I,13+128:
NEXT I:REM TELL ANTIC THAT 64 GR.7 LIN
ES HAVE INTERRUPTS
300 POKE 512,0:POKE 513,6:REM POKE IN
LOCATION OF MACHINE CODE
310 POKE 54286,192:REM ENABLE DLI
```

Program II

```
0 REM DLI EXAMPLE 3
5 REM by Mike Rowe
10 GRAPHICS 8:POKE 87,7:POKE 752,1:REM
 START WITH GRAPHICS 8 TO CONVERT TO G
RAPHICS 15 (WILL THEN WORK ON 400/800)
15 DL=PEEK(560)+PEEK(561)*256:REM STAR
T OF DISPLAY LIST
20 FOR I=DL TO DL+133:IF PEEK(I)=15 TH
EN POKE I,14+128:REM CHANGE TO GR.15 A
ND ADD DLI REQUEST
25 IF PEEK(I)=79 THEN POKE I,78+128:RE
M AGAIN BUT ALLOW FOR LINES WITH LMS C
ALL
30 NEXT I
40 FOR I=DL+134 TO DL+166:POKE I,14:NE
XT I:REM CONVERT REST OF SCREEN TO NOR
MAL GR.15
45 COLOR 2:REM DRAW DESIGN IN COLOUR 2
50 FOR J=1 TO 7:READ X:FOR I=1 TO 5:PL
OT X+I,10:DRAWTO X+I,80:NEXT I:NEXT J
55 FOR J=1 TO 5:READ X:FOR I=0 TO 9:PL
OT X,10+I:DRAWTO X+24,10+I:NEXT I:NEXT
 J
60 FOR J=1 TO 3:READ X:FOR I=0 TO 9:PL
OT X,40+I:DRAWTO X+24,40+I:NEXT I:NEXT
 J
65 FOR I=121 TO 125:PLOT I,10:DRAWTO I
,49:NEXT I:FOR I=104 TO 110:PLOT I,49:
DRAWTO I+15,80:NEXT I
70 FOR I=71 TO 80:PLOT 131,I:DRAWTO 15
5,I:NEXT I
80 ? CHR$(125):? ,"128 COLOURS!"
100 FOR I=1536 TO 1536+17:READ A:POKE
I,A:NEXT I:REM READ IN MACHINE CODE
120 POKE 512,0:POKE 513,6:REM TELL OS
WHERE THIS IS
130 POKE 54286,192:REM ENABLE DLI
150 GOTO 150
199 REM MACHINE CODE AND PICTURE DATA
200 DATA 10,30,50,70,90,100,140
210 DATA 11,71,41,101,131
220 DATA 11,71,101
230 DATA 72,24,173,197,2,105,2,141,10,
212,141,23,208,141,197,2,104,64
```

Program III

```
10 REM DLI EXAMPLE 4
15 REM by Mike Rowe
20 REM MULTICOLOURED GRAPHICS 0
100 GRAPHICS 0
110 DL=PEEK(560)+PEEK(561)*256:REM FIN
D START OF DISPLAY LIST
120 FOR I=DL+6 TO DL+28:POKE I,130:NEX
T I:REM TELL EVERY LINE TO JUMP TO DLI
130 POKE DL+3,194
140 POKE 512,0:POKE 513,6:REM POKE IN
LOCATION OF DLI ROUTINE
150 FOR I=1536 TO 1536+45:READ A:POKE
I,A:NEXT I:REM READ IN MACHINE CODE
160 DATA 72,138,72,174,255,6,189,64,6,
141,10,212,141,24,208,141,198,2,189,11
4,6
170 DATA 141,23,208,141,197,2,238,255,
6,173,255,6,201,24,208,5,169,0,141,255
,6,104,170,104,64
180 POKE 1791,0
190 POKE 54286,192:REM ENABLE DLI
200 READ A:POKE 1623,A:FOR I=1600 TO 1
622:READ A:POKE I,A:NEXT I:REM READ IN
 24 VALUES FOR EACH LINE COLOUR
210 DATA 006,022,086,118,240,100,160,0
48,036,092,100,158,122,168,250,028,032
,080,060,140,180,070,220,160
220 READ A:POKE 1673,A:FOR I=1650 TO 1
672:READ A:POKE I,A:NEXT I:REM READ IN
 LUMINANCE OF THE CHARACTERS
230 DATA 0,2,4,0,8,10,12,14,0,2,8,6,8,
10,12,14,8,2,4,6,8,10,0,14
```

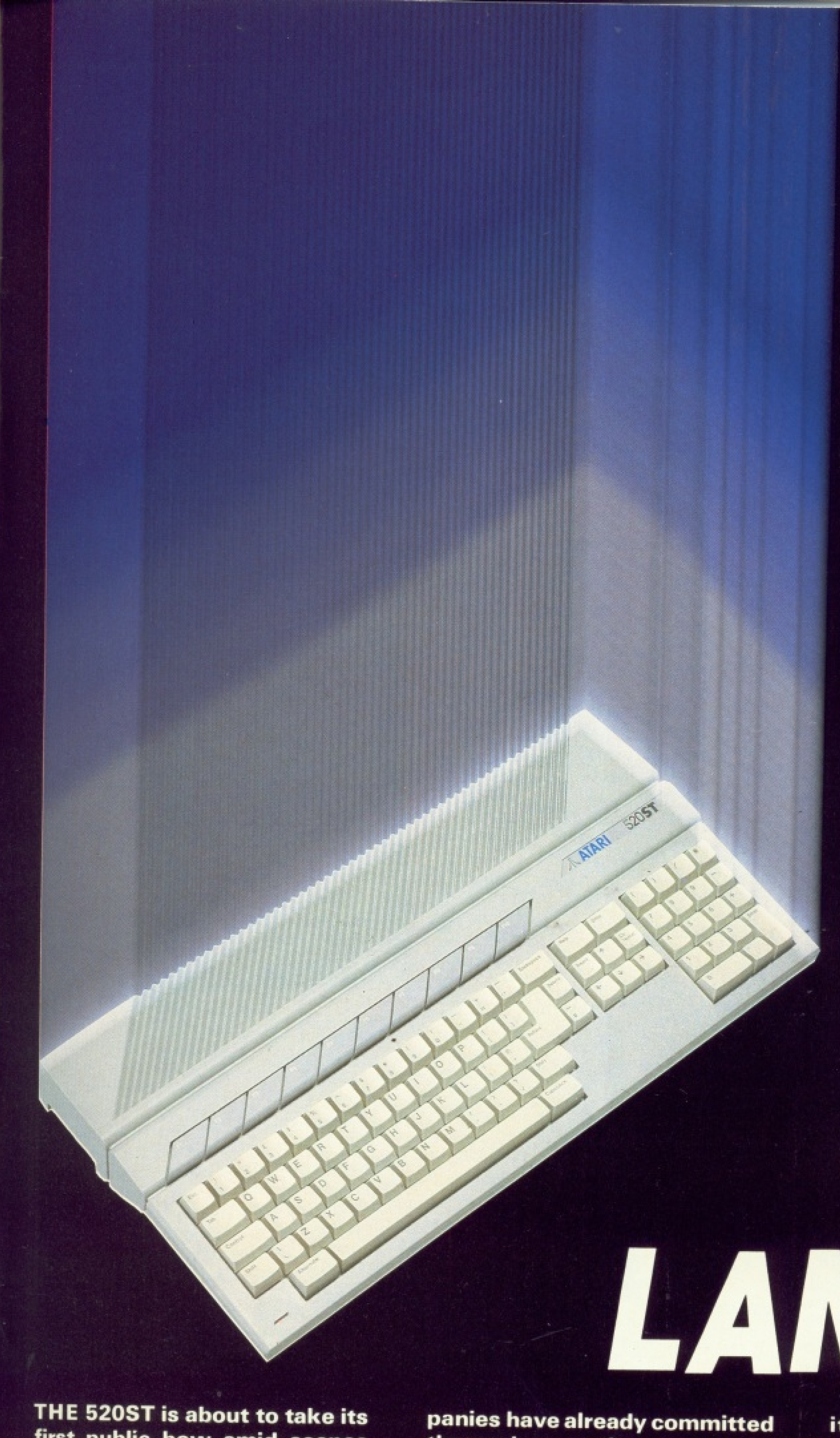
Program IV

All these examples involve altering colours on screen, but other uses are just as easy. As mentioned before, you can change character set part way down screen.

You can run sound effects or music in DLIs. You can split players part way down the screen to make it appear as though there are more than eight player-missiles. Finally you can use DLIs to get horizontal scrolling in different directions on different lines.

Remember, as far as the Atari is concerned, it's not at all rude to interrupt.

8-PAGE SPECIAL FEATURE



THE 520 ST HAS LANDED

THE 520ST is about to take its first public bow amid scenes never before witnessed in the micro industry anywhere in the world.

In the UK alone some 80 software houses have been working around the clock to launch programs on the ST bandwagon.

A similar number of companies have already committed themselves to the new machine States-side – making this the biggest pre-launch build up ever seen.

Billed as revolutionary both in power and price, the 520ST has already lived up to its name in the opinion of all leading British computer magazine reviewers. According to them it is no longer just a new machine, but THE machine for 1985 and the foreseeable future.

The 520ST has caught the imagination of both the industry and the critics alike. And after its formal launch at this month's PCW Show it is expected to take the buying public by storm . . .

The race is on to provide a wide range of ST goodies

LANGUAGES are in the pipeline at Metacomco and should be ready for demonstration at the PCW Show.

The company will bring out a full C compiler, ISO standard Pascal, macro assembler and full Lisp compiler for the ST.

An Atari development kit, consisting of one language plus editor, manual and example programs, will retail for about £80, says Metacomco's Peter Mackeonis.

A MUSIC system and a flight simulator for the ST have been promised by Island Logic, though no prices or release dates have been set.

The music system will be similar to Island Logic's BBC and Commodore version "but by utilising the capabilities of GEM will be a lot more elegant on a window-based ST system".

The flight simulator will make users feel they are flying over real landscapes, thanks to the ST's graphics capabilities, says the company.

SOFTWARE publisher Talent is converting Lost Kingdom of Zkull for the ST.

The text adventure is set in real time, has hundreds of locations and a large vocabulary, and many traps, tasks, puzzles and mazes.

The company also plans to bring out Flexfile, a data management system with new techniques of user interfacing to offer a wide range of facilities without the need for programming.

It will run under the GEM operating system for single file applications – lists, medical records, personnel histories, credit and stock records, on single card index.

Flexfile is menu-driven, integrated with the GEM environment of icons, drop-down menus and mouse, and uses variable sized overlapping windows.

Data entry is at the keyboard, with most other operations mouse-driven. Optional in-screen help windows prompt the user at every stage with no programming languages required.

The record card is user-defined, can be of any size up to the limit of a single screen, and can hold a number of fields such as numbers, dates, class variables and strings.

Talent intends to demonstrate both programs at the PCW Show.

EXPECTED to be available to the public in late October is Computer One's version of C with source debugger, assembler and full screen Lisa-type editor making full use of GEM.

The company is also considering porting its QL monitor across to the ST. "It should be quite impressive with windowing facilities", says Computer One's Chris Bentley.

The C language package will be demonstrated at the PCW Show.

OASIS Software will almost certainly be bringing out a comprehensive assembler and a monitor to operate with the assembler to simulate a logic analyser.

The company may also do Atari ST versions of its graphics utilities like White Lightning, and will be aiming to get at least one ST product on the market for Christmas.

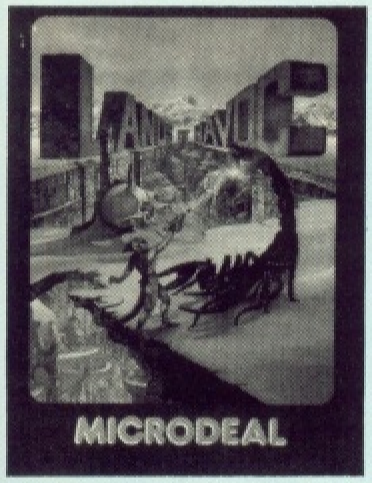
FIREBIRD won't talk about a 68000 version of the best selling cult game Elite – Acornsoft's hold over the name complicates any plans the BT-owned software house may have for an Atari version.

But Firebird has commissioned an independent author to write an ST game it hopes will be just as good.

This substantial project, which has the working title Star Glider, should be released early next year, says Firebird's Herbert Wright.

"It has a lot more in it than the usual arcade or adventure game, including some pretty flashy graphics".

Some of the work that has already been done on it will be demonstrated at the PCW Show.



THE race between UK software houses to announce the first program for the 520ST has been won by Microdeal of Cornwall. It has pipped some 80 other companies to the post with the news that its arcade adventure game, Lands of Havoc, is to be released this September.

This came only a matter of weeks after Atari made development systems for the new machine available.

Atari User asked Microdeal's John Symes how his company was able to be so quick off the mark.

"Lands of Havoc was already available for the Commodore and the QL", he explained, "and although we took a year to develop the game the program was written on a Vax mini computer so we could easily adapt it for the Atari".

It was the success of the original versions which resulted in it moving over to the 520ST. "Atari asked us to bring the game to them", revealed John Symes. "They must have been impressed because once they saw what it was like they agreed to provide us with a development system".

Lands of Havoc boasts 2,000 screens. The object is to bring about the downfall of the Dark Lords who have turned the once bountiful land into a place of desolation.

The disc costs £19.95.

QUEST International is working on two major business software packages, both conversions of proven programs.

Cash Trader, an accounting package designed for smaller businesses, should be ready for demonstrating at the PCW show. The ST version is likely to cost less than the £195 price tag on previous versions.

The Padmede business control system, a fully integrated five module accounts package, is two thirds ready for the ST, says Quest's Daniel McNulty.

It will cost less than the £1,245 charged for other versions.

McNulty says Quest is committed to producing business software for smaller micros and has a vested interest in designing programs for the ST.

AN ST version of its 8-bit Atari light synthesiser Colourspace is being developed by Llamasoft.

The multi-coloured special-effects generator is operated by a combination of keyboard and joystick to produce the kind of light shows seen at rock concerts.

The planned synthesiser for the ST should provide even more spectacular displays, says Llamasoft.

A NEW page make-up system for the ST, to be called the Fleet Street Editor, is being developed by Mirrorsoft.

The company says it will drive a full phototypesetting system and will include full graphics and the ability for users to develop their own illustrations.

Due for release in March, 1986, and costing in the region of £60, it has been developed by Jill Zaum, who was primarily responsible for the software being used to generate page make-up for the Mirror Group of newspapers.

Mirrorsoft state they are definitely planning further developments for the ST, believing it to be a major machine in 1986. A flight simulator is already planned.

SCHEDULED to be on sale early next year is an "extremely large and complex game" for the ST from Martech.

The program is "very heavily into graphics capabilities of the 520ST, and involves several simulations in a war type scenario", a spokesman said.

PROGRAM development aids for professionals and the serious hobbyist are on the way from GST Computer Systems.

The company is porting its successful C compiler, macro assembler and linker from the QL.

The first ST product will encompass all three components and the company is also likely to issue the macro assembler and linker together at a later date, says GST's Chris Sheybeller.

Prices should be announced at the PCW Show.

The firm is almost certainly going to produce a low cost GEM toolkit, which should be out before Christmas, and has plans for cross-compilation tools to help the smaller software houses.

A POWERFUL communications package available from late September is promised by Kuma Computers.

The "all encompassing" software will handle all types of electronic communications including MicroLink, Telecom Gold, bulletin boards, Prestel and file transfer.

Also available at the same time will be word processing, spreadsheet and database software with some very nice features, says the company.

Kuma has been working in 6800 machine code for a couple of years and is really impressed with the 520ST.

Languages and other tool type software is well along the pipeline too, the spokesman said.

The first Kuma products for the ST will be demonstrated at the PCW Show.

Watch Atari User every month for all the latest ST news



How an ST game is born

A FORMER miner who first became interested in computers through playing arcade games in pubs is the author of Microdeal's Lands of Havoc.

Steve Bak of Mansfield graduated from zapping aliens to writing complex programs in six machine languages.

Now his former credits include the Cuthbert series – well known to Dragon and Commodore 64 users – and Scramble for the Tandy colour computer.

But how did he go about creating a program such as Lands of Havoc? Bak told *Atari User:*

"The first stage involves a lot of sitting down and thinking while an idea comes to you. Once the idea is there you have to think about structuring the game so it is both interesting and progressive to play.

"Presentation is the next thing to worry about, how the game should appear on screen. The story line also needs filling in".

This stage took Bak four months, working 50 hours a week "plus stealing a few hours of other people's time". It was at this point he realised the game would not be able to compete with many other bigger games on the market for it then only had 80 screens.

He enlarged it by developing the storyline further and eventually added another 1,920 screens. This part was not a solo effort, however.

"I try to involve people who are not programmers as a scientific mind usually sees things in black and white, whereas non-programmers seem more creative and are able to add to a story", he said.

Only then did Bak start the actual programming. The original game for the Commodore took three months, the Spectrum version two, and the latest, for the ST, another two.

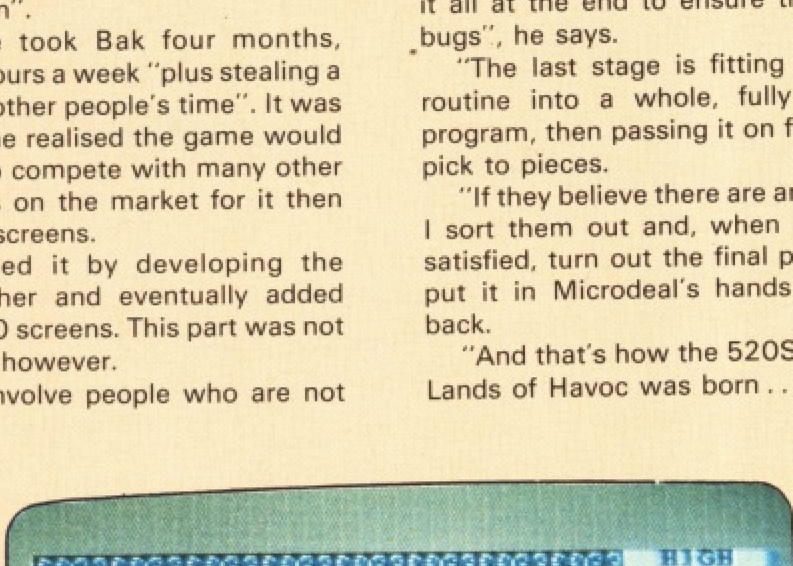
Bak had to write routines for every step of the game.

"I do not write more than 100 lines a night so I am fresh enough to go through it all at the end to ensure there are no bugs", he says.

"The last stage is fitting each small routine into a whole, fully integrated program, then passing it on for others to pick to pieces.

"If they believe there are any problems I sort them out and, when everyone is satisfied, turn out the final program and put it in Microdeal's hands while I sit back.

"And that's how the 520ST version of Lands of Havoc was born . . ."



IT'S A REAL GEM OF AN IDEA

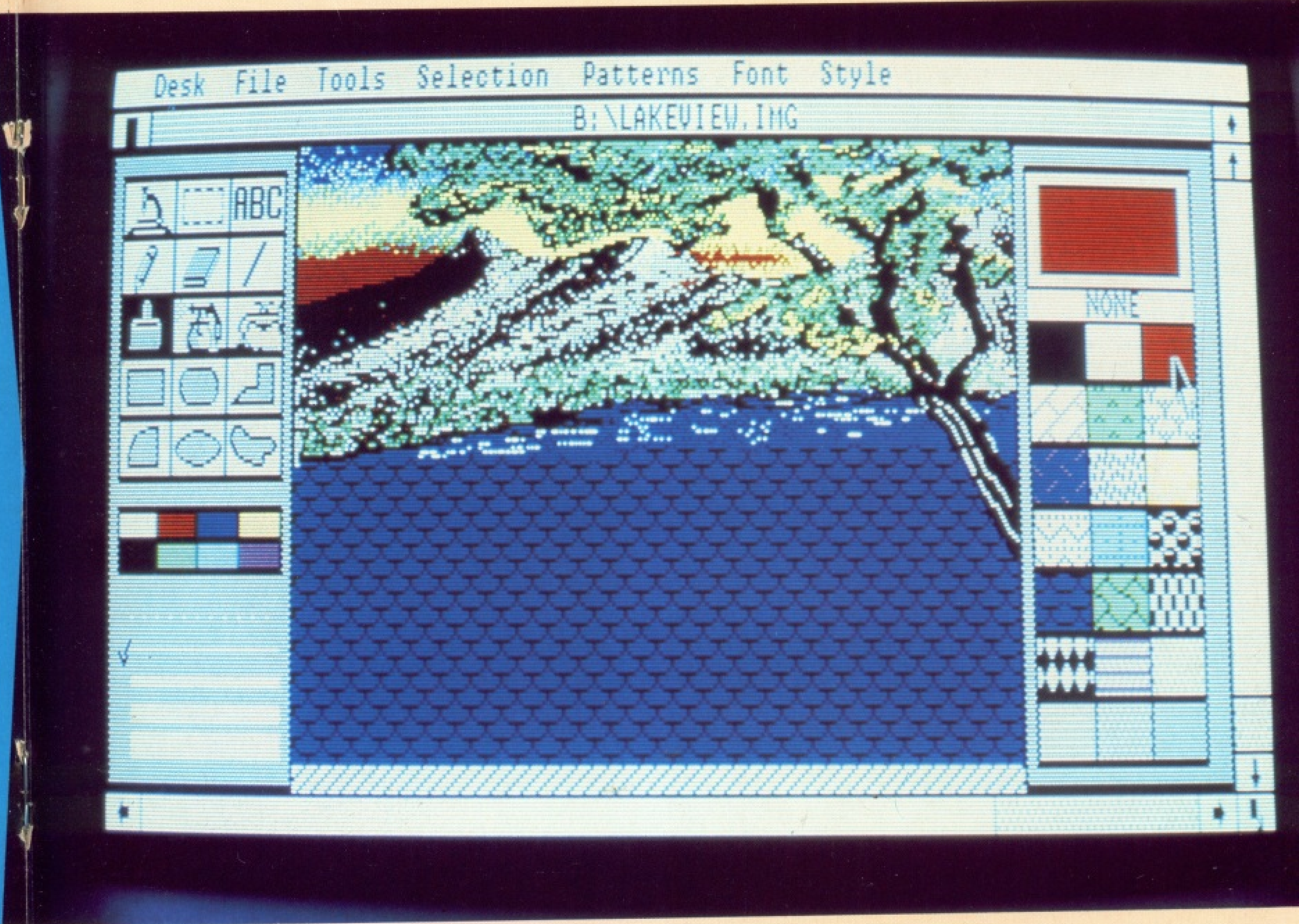
THOSE who have followed Digital Research's fortunes from the launch of CP/M in 1975 through to Concurrent PC-DOS in 1984 will appreciate that as a systems house, we have so far specialised in languages and operating-system products for the industry.

However, we are taking a different approach with GEM because it is a user interface which is compatible with a wide range of applications, operating systems, languages and hardware.

GEM will have more impact on the end-user market than any other product which we, or any other

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**Frank Iveson is Director, Northern European Operations, Digital Research (UK).*



Artistic work made easy with GEM applications packages

By FRANK IVESON

software house, have so far produced.

A working definition of the term "user interface" is "the repertory of commands a user needs to know to make his or her machine work to satisfaction".

Command repertories which require the memorisation of obscure sequences of keystrokes are difficult to retain and the full power of the system may never be fully appreciated by the non-technical user.

This is true of the command structures of CP/M, MS-DOS, PC-DOS and especially of some variants of Unix, which contain certain innocent-looking commands which can destroy the integrity of the system if used at the wrong time.

There is also confusion among users who regularly work at different machines. Often a user has to interrupt work to decide if the command he or she is about to enter does in fact belong to the system in use.

More resistance to personal computer use stems from the obscurity factor than any other non-cost consideration – especially among women.

Menu-driven applications are also affected by obscurity. Menus provide more clues than commands, but a major difficulty for the novice is the disappearance of the subject matter from the screen while choosing a menu option. Even for experienced users, this causes continuing frustration with the software. Users are ready for something better.

The GEM user interface remedies these frustrations and eliminates obscurity. More than 50 software houses have stated their intention to publish GEM-based packages by the end of the current year.

Among these are Chang Labs, Compsoft, Pegasus, Thorn EMI Computer Software, Lifetree, Infocom and ABC Software.

The available GEM applications include GEM Desktop, which replaces operating system commands, an advanced word processor, GEM Write, graphics programs such as GEM Graph and GEM Draw and several business packages including SPI's well-known Open Access suite.

The 520ST is now shipping with Desktop, GEM Paint and DR Logo under GEM. GEM Paint is a drawing and design package and DR Logo is the Digital Research version of Logo

which won a European computer press award presented last year by West Germany's Chip magazine.

The fundamental research behind the GEM concept was done in the early '70s by Xerox PARC in the US and was first implemented on Xerox's Star network, and later by Apple on Lisa and Macintosh. GEM is therefore based on a long history of user experience.

Xerox's recent commitment to GEM is a further indication of the maturity of the product, and reinforces the approach of this special interface as an industry standard.

GEM Desktop, the operating system metaphor, is the first GEM application that most users will come across. Visually, its screen resembles a bird's-eye view of a desk, with documents, folders, disc drives and a rubbish bin. These objects are called icons.

Analogues of real world accessories such as calculators and clocks are also available. At the top of the screen is a menu bar.

In GEM Desktop and all other GEM applications the user selects a resource by using a mouse or the cursor keys to move a pointer on the screen over an icon or desk accessory.

Clicking the mouse – or keyboard equivalent – selects the resource represented. Moving the pointer to a command on the menu bar causes a sub-menu to drop down into the top quarter of the screen.

Thus, in GEM Desktop, selecting a disc drive icon and moving the pointer to the File command on the menu bar reveals the File dropdown menu. Clicking on the command Open in this dropdown menu displays the contents of the drive in a directory window, and the dropdown menu disappears.

The directory window contains more icons – named folders and documents, representing files and applications.

By moving the pointer over a folder and clicking, the folder is selected. Repeating the menu bar procedure as above, or double clicking, opens up the folder into a second icon-filled window which overlaps the first and contains a catalogue of the folder contents.

Pointer movements can delete or save files and groups of files in the window by dragging them to the rubbish bin or to a disc drive, can change the sizes of the desktop area and the windows and can scroll their contents.

They select the whole range of commands available in Desktop via the menu bar and dropdown menus.

ATARI'S decision to bundle the 520ST with GEM has been described as a brilliant marketing ploy by UK computer market observers.

This is due to the fact that GEM allows the ST to offer similar working environments to machines like the Macintosh which are more than double the price.

Even the market leading IBM is getting in on the act. GEM is currently available in 10 retail applications for the IBM PC.

Meanwhile the number of major manufacturers who have become licensed to distribute GEM and GEM applications with their machines has risen to more than 20.

No command has to be typed in, or memorised. Errors are explained in full in dialogue boxes which contain options for recovery.

For drawing and painting applications, use of a bitpad or tablet and pen are even more intuitive to users.

Having mastered the simple skills of hand and eye co-ordination in moving the pointer with the mouse or other pointer device, the user has only to become familiar with the simple logic of GEM's visual command structure in Desktop to know how to get started with all other applications, because GEM is a highly consistent user interface.

Non-GEM applications coexist with GEM applications written to the same operating system. Running a non-GEM application is simply a matter of opening the appropriate application folder icon, when control is handed back to DOS and the application runs normally.

Co-existence is possible because the functionality of GEM software is based on a system extension which does not interfere with the workings of the underlying operating system.

The GEM system extension and GEM software can be implemented on any 16 and 32 bit CPU configuration, for CP/M, MS-DOS, PC-DOS and Concurrent DOS operating systems.

GEM's applicability to a wide range of hardware configurations and operating systems will help good GEM applications to spread fast from one machine to another and/or between operating systems.

Moving GEM itself to another machine only requires minor modifications to peripheral parts of the GEM software.

For example, a software developer wishing to move an application written for the Macintosh's 68000 environment to a more popular computer, need only implement minor modifications of subroutine calls to convert it to GEM, followed by recompilation for another operating system.

Because IBM dictates in the personal computer market, other manufacturers, software houses, dealers and users all need a standard IBM compatible user interface. GEM is such a standard and it will migrate to all conceivable 16 and 32 bit configurations of the future.

In the US, amid claims made for Microsoft's Windows and IBM's Topview, GEM Desktop is the only machine independent icon based user interface on the market and selling in volume.

Speeding applications

TO speed the development of versions of GEM applications by manufacturers and software developers, Digital Research has introduced the GEM Programmers Toolkit.

The Toolkit itself uses a GEM interface, and programmers are pleased with it. They expect the graphics to be slow, but in fact GEM's fast code doesn't sacrifice performance.

The Toolkit allows programmers to interactively design GEM icons and other objects without resorting to back-of-envelope calculations or special coding. With Toolkit's icon editor, for example, the programmers paint and edit an object at the pixel level until satisfied, and the Toolkit generates the code automatically.

Similarly, text for custom dialogue boxes is installed simply by typing it in, using any of the major West European languages whose character set is supported by the operating system in question.

GEM applications are also possible in a number of high-level languages for which the Toolkit can be equipped

Demonstration programs may be produced in a matter of days, and full-scale implementations within a few months.

The Toolkit also comes with good licensing agreements allowing software houses and manufacturers to bundle GEM Desktop with their own applications or machines.

One OS – or two?

JEREMY VINE digs deep into the inner workings of the Atari 520ST to explain the interaction of TOS and GEM

THE ST has many remarkable features, not least of all its operating system. To most users, the ST is controlled by the GEM – Graphics Environment Manager – and that is the means by which users will communicate with the machine.

However, buried away from sight is the TOS – Tramiel Operating System – or what most people understand to be a DOS – disc operating system. When the ST is booted up, which at the moment is done from the TOS system disc, the machine not only loads the TOS into RAM but also loads the GEM Desktop, which is the screen that appears when loading is complete.

The name "TOS system disc" is slightly misleading, as you can see, because it contains far more than merely the TOS.

Despite the name TOS and the state of the art hardware, the DOS is in fact a virtual clone of CP/M 68k. I say virtual as there are differences which are not strictly part of CP/M and it would appear to mix in some of the better features of MS-DOS. But more of that later.

Designed by Digital Research, CP/M 68k, as its name suggests, is a version of CP/M which runs on a 68000 processor, the chip at the heart of the ST.

Now all this may seem to be confusing. Which is the operating system – GEM or TOS?

To understand the function of these systems it's important to realise the purpose of a DOS. Stated simply, it is a program, or more accurately a number of programs, that process commands inside the micro.

As these operations are related to accessing the disc drive, though not exclusively, the term is DOS rather than OS – operating system.

The function of the DOS is to see that commands and files of data are processed and in general take away from the user the headaches of what is happening inside the machine.

From the user's point of view, the DOS is a convenient method of helping him to manage his files on disc.

The means of control are by typing a command line, say, DIR, for a directory of files. But as useful as that is, systems like CP/M have not been renowned for their friendliness. Command lines like:

PIP B:=A:*.*

are not quick to type, nor are they immediately obvious. The above command line merely tells the system to copy all files from disc drive A to drive B. And this is what salesmen have called user-friendly systems . . .

To make life easier, these functions of a DOS – copying, formatting, and so on – are presented by a GEM system in pictures, or to be more accurate, icon graphics.

Just point the mouse, drag the icons, click and the files are copied. OK, so far, but if the GEM system does all this why bother with the TOS? Well it's not quite as simple as I've made out so far.

The TOS is far more complicated, and those developing professional software will need the command facilities of TOS to probe the inner depths of the machine.

Unfortunately for the enthusiastic user, Atari has not made this easy and there is no straightforward method of entering TOS.

But more importantly, the TOS is THE operating system of the ST. GEM is merely a second level operating system which is under the control of TOS and the ST.

GEM DOS, also developed by Digital Research, needs certain requirements in order to work.

At least 128k of RAM is needed and of course the 520ST meets this more than adequately. This requirement explains why the 130ST – 128k RAM – has not and might not be released.

Atari has the intention of placing the TOS and GEM system in ROM, within the machine. This would of course release valuable space within the memory and increase speed.

Although the requirement is for a minimum 128k, the TOS and GEM Desktop together on the system disc account for around 200k of code. This also explains why the machine takes about 30 seconds to boot.

The TOS is an interesting beast as it is not quite one thing or the other.

A first glance at it suggests that it is merely a copy of CP/M 68k and considering DR's involvement in the entire package – GEM and LOGO – this would hardly be surprising.

But unlike CP/M 68k the filing system can be hierarchical, which is a definite improvement. This feature is reminiscent of MS-DOS and is more than just a nice touch.

The GEM Desktop allows the user to open different folders for storage of files. These folders are in effect sub-directories under the main directory.

This can be seen if opening a folder from within a present directory. The window display shows the contents within that folder – sub-directory – and closing the window returns the

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* *Jeremy Vine is a freelance writer and author of several books including one on the Atari ST, The ST Companion.*

user to the directory above. In this way a hierarchical directory structure can be created.

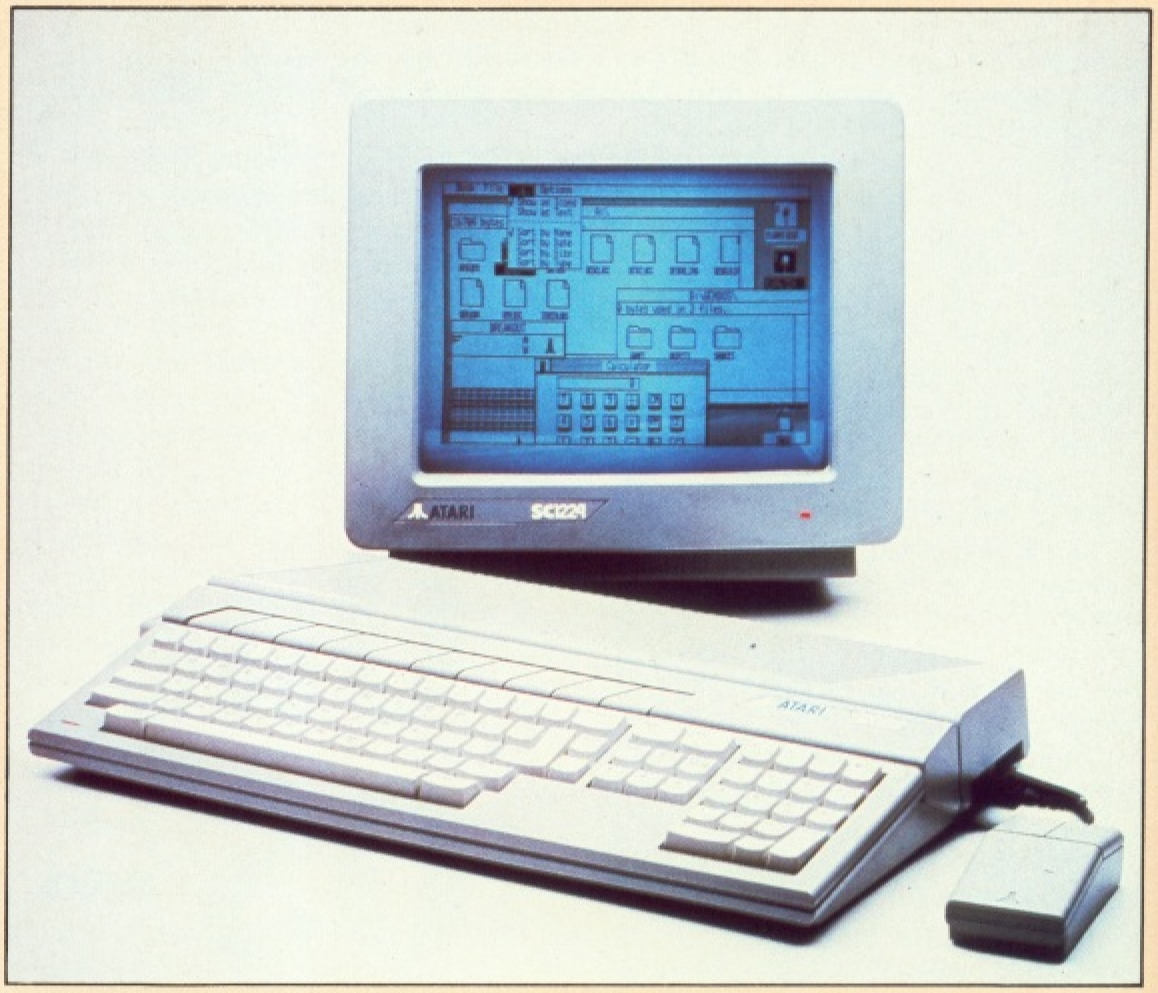
As GEM has this structure the parent DOS – as I will refer to TOS – also has a hierarchical nature. So it is more than just cosmetic. Creating directories within directories is a convienient method of splitting up and finding files.

But what else happens when you boot up the machine with the system disc?

The purpose of booting the ST is not only to load TOS and GEM but to initialise the entire system and carry out certain status checks.

These determine what kind of monitor is being used – mono, colour and so on – whether there are applications in cartridge memory that can be run, that is, a cartridge is inserted, setting various registers to default values, and a host of other vital functions.

Of course this is transparent to the user and all you will see is the pretty desktop display once booted or the particular application if using a cartridge.



The status of the desktop can be saved at any point and this is stored in a file called DESKTOP.INF. This contains all the startup conditions of the desktop, these being the number of windows open – if any – their positions on the screen, which drive(s) to access and the labels assigned to the disc identifiers.

It also provides information to the system about the way in which an application should be run. This information is set up by the user with the INSTALL APPLICATION option on the desktop screen.

And that just about concludes this brief look at the TOS and GEM.

Fortunately for the user, these two systems work in unison and together provide a powerful and easy means of control over the main operations of the micro.

The overall manager is the TOS, with the GEM system as a second level operating system.

GEM is the friendly face of the ST and the one part of the ST all users will come to know and understand well, but behind the icons and windows is another system which maintains order within the machine.

A case of two systems in perfect harmony – well, that's the theory anyway . . .

American software on the move

NEWS of exciting software being developed for the Atari ST is beginning to filter through from the United States.

Noted producer of the best-selling DB Master database, Stoneware, has reached an agreement with Atari Corp to develop a new filing program for the ST. The company promises it will be "extremely easy for the entry level home or business user".

Users will be able to select colours and change fonts, as well as lay out files to suit individual needs.

Microbits is developing the Omega telecommunications package for the ST and existing 8-bit Atari computers. It will have icons, windows and pull-down menus and will use either a mouse or joystick.

The 16-bit program is expected to cost about $50. Microbits is also developing a 3D battle-zone game for the ST.

Spinnaker Software expects to have eight products for the ST shortly. These are believed to be adventure games. Infocom is planning to convert its entire line of text adventures.

And Sierra On-Line intends to bring out top-selling favourites King's Quest and Ultima II for the new machine.

Getting in first

AN enterprising UK distributor went Transatlantic to ensure it would be the first company to be able to deliver software for the 520ST. Faced with the prospect of shortages here for some time to come, Software Express arranged to import programs from Haba Systems of Vannuys, California, itself breaking new ground as the initial company to produce software for the new machine States-side.

The distributors' first consignment, which was due to arrive in August, included Haba Check Minder, HabaCom and Haba Hippo "C".

Check Minder is a money manager program which enables the user to monitor income and expenses and prepare tax returns.

The second, HabaCom, is a telecommunications program which supports terminal emulation, direct link to the computer, and VT100, TTY/CRT and full/half duplex baud rates.

Haba Hippo "C", the third program, is a complete language system consisting of compiler, assembler and linker. It supports GEM DOS calls and functions.

Depending on the rate of exchange between the two countries, prices for Check Minder and HabaCom are expected to be around £50, while Hippo "C" will cost in the region of £60.

This month Software Express is expecting delivery of two more programs – HabaWord, a word processor with large document capabilities, and HabaCalc, a versatile spreadsheet. Prices have yet to be fixed.

The company is currently negotiating for more American software for the ST but the deals have yet to be finalised.



ATARI ST

520ST

POWER WITHOUT THE PRICE

THE NEW ATARI 520ST

Under the new leadership of Jack Tramiel (former boss and founder of Commodore Business Machines), Atari Corporation have marked their entry into the world of business/personal computers with a machine which leaves the competition standing. Tramiel's slogan 'Power Without the Price' has been implemented in the manufacture of the new 512K Atari 520ST colour computer which offers the user amazingly high performance at an incredibly low price. Launched as a work-station, this new system incorporates seven software packages as well as the 520ST computer with 512K RAM, mouse controller, high resolution monochrome monitor (640x400), 95 key keyboard (with 18 key numeric keypad), MIDI interface, GEM and a 500K 3½ inch disk drive, all for the package price of only £651.30 (+VAT = £749). Dubbed the 'Mac beater' and the 'Jackintosh' (after Atari's Chief, Jack Tramiel), Atari's new machine has been directly compared with the Apple Macintosh RRP £2595 (+VAT = £2985) which offers similar features and capabilities but at a much higher price. Favourably reviewed by the UK's highly critical specialist computer press, the 520ST is likely to make a great impact in this country as a sophisticated alternative to an IBM PC, APRICOT or APPLE MACINTOSH. Unlike its overpriced competitors, the Atari 520ST can be linked up to a colour monitor to unleash a choice of up to 512 colours. The addition of colour brings out the full potential of graphics packages such as GEM.

USER FRIENDLY GEM OPERATING SYSTEM

The power of the ST is harnessed and made user friendly by the new operating system 'GEM' from Digital Research. GEM stands for Graphics Environment Manager and allows a user friendly colour or B/W graphics interface which closely resembles that of the Macintosh. This similarity extends to the use of moveable resizeable windows, icons to represent objects such as disks and disk drives, and the use of pull down menus and a mouse. The advantage of all this is that the computer becomes extremely easy to use. GEM has now been implemented for the Acorn, ACT, Atari, IBM, ICL, and Olivetti. Software written for GEM on one computer should also run under GEM on another computer. This will enable the market to quickly produce a large library of standard interchangeable software.

FREE SOFTWARE AND FUTURE EXPANSION

The Atari 520ST comes supplied with seven free software packages as listed below: 1) TOS -Tramiel Operating System based on CPM 68K. 2) GEM Graphics Environment Manager by Digital Research (DR) giving a WIMP (Window, Icon, Mouse, Pull down menu) environment. 3) DR GEM Paint for creating graphics masterpieces. 4) DR GEM Write for word processing. 5) Logo learning language to enable you to write your own programs easily using turtle graphics. 6) DR Personal Basic a powerful user friendly version of the Basic programming language. 7) BOS operating system giving you access to dozens of business applications packages already available on the market. Designed with future expansion in mind, the ST also features a host of different interfaces to the outside world and an impressive list of accessories is planned. Atari will soon be releasing a 1000K (1MB) 3½ inch disk drive, and a 15MB hard disk storage system as well as a mass storage compact disk (CD) player capable of storing an entire 20 volume encyclopedia on one disk. A full range of inexpensive printers are planned including dot matrix, daisywheel and thermal colour printers. With its unbeatable graphics, speed and software at a price which is far below that of any comparable personal computer currently on the market, the ST is all set to do battle with the competition. To receive further details of the ST from Silica Shop, just fill in the coupon below with your name and address details and post it to us.

Silica Shop Price: £651.30 + £97.70 VAT = £749.00 This price includes:

- ★ 512K RAM
- ★ MOUSE
- ★ GEM
- ★ B/W MONITOR
- ★ 500K 3.5" DISK DRIVE
- ★ KEYBOARD (95 KEYS)

£749

ATARI 520ST SPECIFICATION

MEMORY
512K RAM (524,288 bytes)
16K ROM expandable to 320K
Port for addnl 128K plug-in ROM cartridges
200K TOS operating system

GRAPHICS
Individually addressable 32K bit-mapped screen with 3 screen graphics modes:
320x200 pixels in 16 colours (low resolution)
640x200 pixels in 4 colours (med resolution)
640x400 pixels in monochrome (high res)
16 shades of grey in low res mode
512 colours available in low/medium res
8 levels of each in red, green and blue

ARCHITECTURE
4 custom designed chips:
GLUE Chip - MMU Memory Mngmnt Unit
DMA Controller - Graphics Processing Unit
16/32 bit Motorola 68000 processor at 8MHz
eight 32 bit data registers
eight 32 bit address registers
16 bit data bus/24 bit address bus
7 levels of interrupts/56 instructions
14 addressing modes/5 data types

DATA STORAGE
High speed hard disk interface
Direct memory access 1.33 Mbytes per second
CD (Compact Disc) interface
Built in cartridge access
Dedicated floppy disk controller

DISK DRIVE
500K (unformatted) s/sided 3½" floppy d/drive
349K (formatted) storage capacity

SOUND AND MUSIC
Sound Generator
Frequency control from 30Hz to above audible
3 voices (channels) in wave shaping sound in addition to a noise generator
Separate frequency and volume controls
Dynamic envelope controls
ADSR (Attack, Decay, Sustain, Release)
Noise generator
MIDI interface for external music synthesizers

KEYBOARD
Separate keyboard microprocessor
Standard QWERTY typewriter styling
Ergonomic angle and height
95 keys including 10 function keys
Numeric keypad — 18 keys including ENTER
One touch cursor control keypad

MONITOR
12" screen - high res monochrome monitor
640x400 monochrome resolution

VIDEO PORTS
Display - Low Resolution - 40 columns
Med/High Res - 40/80 plus cols
Medium res RGB (Red/Green/Blue) output
High resolution monochrome (Black & White)

COMMUNICATIONS
Bidirectional centronics parallel interface for printers, or modems capable of input/output
RS232C serial modem/printer interface
VT52 Terminal Emulation Software
Maximum Baud Rate up to 19,200
High speed hard disk interface
Floppy disk controller (Western Digital)
2 joystick ports (one for 2 button mouse)
MIDI interface for external music synthesizers

GEM WIMP ENVIRONMENT
WIMP - Window Icon Mouse Pop-down menus
Two button mouse controller
Icons/Pull down menus/Windows
GEM VDI - Virtual Device Interface
GEM AES - Application Environment Services
GEM BBT - Bit Block Transfer
Real time clock & calender

SOFTWARE
GEM environment
with user friendly Macintosh style operation
'TOS' - Tramiel Operating System
Atari's own system based on CP/M 68K with hierarchical directory & file structure plus a host of MS DOS & UNIX command structures
'BOS' - Business Operating System
to run any standard BOS business programs
GEM desktop
with GEM PAINT graphics mgmt system and GEM WRITE word processor
Personal BASIC and DR Logo
originally written by Digital Research (DR) Very much like those on other machines except for the extensive use of pull down menus, mouse control and windows

VARIOUS
Dimensions: 470mmx240mmx60mm
Replaceable external power supplies
Expansion: 3½" floppy disk drives 500K/1,000K (two drives can be connected)
3½" 15Mb hard disk
CD (compact laser disc)
Dot matrix & d/wheel prntrs (black)
Thermal dot matrix (colour)
RGB & monochrome monitors

LANGUAGES
BASIC & LOGO supplied
Many others will soon be available, including: Assembler, BCPL, C, Cobol, Compiled Basic Lisp, Modular-2 and Pascal

Note: Some of the above specifications are pre-release and may therefore be subject to change

MACINTOSH v F1e v 520ST

"Imagine a Fat Mac - the 512K Apple Macintosh - but with a bigger screen, a far bigger keyboard with numeric keypad, cursor and function keys, and colour. That gives you some idea of what the Atari 520ST is like, except for two important things. First the Atari seems faster. Second the Atari system is about one third of the price."
June 1985 - Jack Schofield - **PRACTICAL COMPUTING**

FEATURES OF BASIC SYSTEM	APPLE MACINTOSH	APRICOT F1e	ATARI 520ST
Price includes B/W Monitor	YES	NO - extra £200	YES
Keyboard size mm (LxDxH)	330x147x50	450x167x28	470x240x60
Keyboard size ins (LxDxH)	13x5¾x2	17½x6½x1	18½x9½x2½
3½" D/Drive (Unformatted)	500K	500K	500K
3½" D/Drive (Formatted)	399K	315K	349K
WIMP (Window, Icon, Mouse ...)	Apple	ACT - Activity	GEM
Real-time Clock	YES	YES	YES
Polyphonic Sound Generator	YES	NO	YES
RS232 Serial Port	YES	YES	YES
Centronics Parallel Printer Port	NO	YES	YES
Dedicated Floppy Disk Controller	NO	YES	YES
Hard Disk DMA Interface	NO	YES	YES
Full stroke keyboard	YES	YES	YES
Number of keys on keyboard	59	92	95
Numeric Keypad	NO	YES (16 Keys)	YES (18 keys)
Cursor Control Keypad	NO	YES	YES
Function keys	NO	10	10
16-bit processor	68000	Intel 8086	68000
Processor running speed	8MHz	4.77MHz	8MHz
RAM size	512K	256K	512K
Number of graphics modes	1	4	3
Number of colours	Monochrome	16	512
Max Screen Resolution (pixels)	512 x 342	640 x 256	640 x 400
Mouse included	Single Button	NO - extra £95	Two Button
Replaceable External Power Pack	NO	NO	YES
Cartridge Socket	NO	NO	YES
Joystick Ports	NO	NO	YES (two)
MIDI Synthesiser Interface	NO	NO	YES
Monitor Size	9"	9" - extra £200	12"
RGB Video Output	NO	YES	YES

System Cost with: Mouse - Monochrome Monitor - 512K RAM - 500K Disk Drive

	APPLE	APRICOT	ATARI
Price of basic system (exc VAT)	£2595+VAT	£595+VAT	£652+VAT
+ Mouse	Included	£95+VAT	Included
+ Monochrome Monitor	Included	£200+VAT	Included
+ Expansion to 512K RAM	Included	£295+VAT	Included
Price of complete system (exc VAT)	£2595+VAT	£1185+VAT	£652+VAT
PRICE rounded down including VAT	**£2,984**	**£1,362**	**£749**

PRESS COMMENT

"Atari's new corporate image as an aggressive low cost computer maker is likely to mirror that of Commodore where Mr. Tramiel established the maxim that 'Business is war'."
August 21st 1984 **FINANCIAL TIMES**

"This is the only personal computer I know of that comes with a Midi interface as standard."
Peter Bright March 1985 **PERSONAL COMPUTER WORLD**

"The (GEM) version running on the Atari 68000 machines will have the additional advantage of leaving the PC version standing." April 6th 1985 **PERSONAL COMPUTER NEWS**

"It would seem that GEM offers the ideal operating system."
March 7th 1985 **POPULAR COMPUTING WEEKLY**

"I found it (GEM) extremely easy to use and was very impressed with the way in which it disguises the unfriendly hardware and operating systems lurking under the surface."
Peter Bright Feb 1985 **PERSONAL COMPUTER WORLD**

"The electronics in the machine are a work of art ... The heart of the 520ST is a Motorola 68000, one of the most powerful 16-bit processors around and in many respects it is close to being a 32-bit chip ... when the machine appears in the shops, I'll be at the front end of the queue to buy one."
Peter Bright June 1985 **PERSONAL COMPUTER WORLD**

"This machine is significantly more powerful than an IBM PC ... If it's possible to design a sure-fire winning machine, this is it." May 11th 1985 **PERSONAL COMPUTER NEWS**

"... the use of GEM makes the new range of Atari computers so similar to the Macintosh (with the added attraction of colour), that they are already being called 'Jackintoshes'."
May 2nd 1985 **COMPUTING**

"The new Atari ST computers truly represent to the consumer what Jack Tramiel is saying — easy-to-use computing power without the price." March 1985 **ANALOG COMPUTING**

"It (the ST) uses the most modern technology that is affordable, in a package that gives a professional impression."
May 23rd 1985 **POPULAR COMPUTING WEEKLY**

"The Atari ST is one of the most elegant designs I have seen ... Atari has used an original and elegant method of memory management which should make the ST faster than any other PC on the market - in any price bracket ... The 64K dollar question is would I go out and spend money for one? To which the only answer is 'Try and stop me!'"
John Lambert July 1985 **ELECTRONICS & COMPUTING**

"The 520ST is technically excellent ... The 520ST hardware is the new standard by which others will be judged."
July 1985 **YOUR COMPUTER**

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ON THE NEW ATARI 520ST COMPUTER

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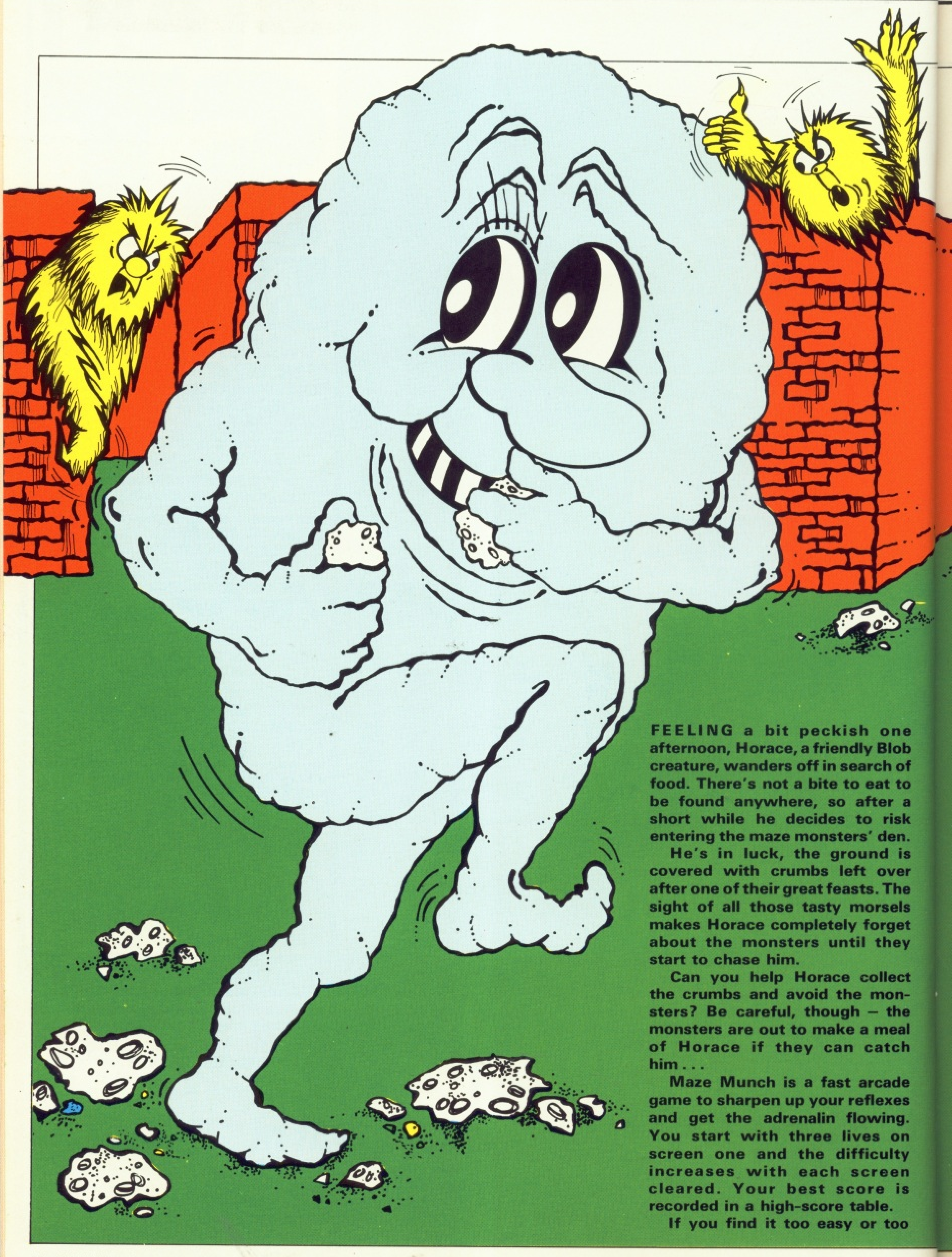
Address: ....

....

....

.... Postcode: ....

Do you already own a computer
If so, which one do you own? ....



FEELING a bit peckish one afternoon, Horace, a friendly Blob creature, wanders off in search of food. There's not a bite to eat to be found anywhere, so after a short while he decides to risk entering the maze monsters' den.

He's in luck, the ground is covered with crumbs left over after one of their great feasts. The sight of all those tasty morsels makes Horace completely forget about the monsters until they start to chase him.

Can you help Horace collect the crumbs and avoid the monsters? Be careful, though – the monsters are out to make a meal of Horace if they can catch him . . .

Maze Munch is a fast arcade game to sharpen up your reflexes and get the adrenalin flowing. You start with three lives on screen one and the difficulty increases with each screen cleared. Your best score is recorded in a high-score table.

If you find it too easy or too



Maze Munch

If you've got an appetite for a fast moving maze game then help Horace munch the morsels in this action-packed game by ROLAND WADDILOVE

hard, the difficulty can be changed by altering L in line 4210. The higher the number the harder it is.

There are several features to interest programmers, so it's not just for games players. A short machine code routine is used for all printing. This prints the multicoloured characters used by directly writing to screen RAM.

If you want to see how it works you can use Kevin Edwards' disassembler which was in the July issue of *Atari User*. The code is stored in page 6 in the memory starting at 1536.

A fast tune accompanies the high-score table, instructions and title page.

The high-score routine shows how to sort numbers and strings in Atari Basic.

The program has been broken down into short subroutines as usual and is as structured as possible. A title at the start of each subroutine describes its function so it should be fairly easy to follow.

VARIABLES

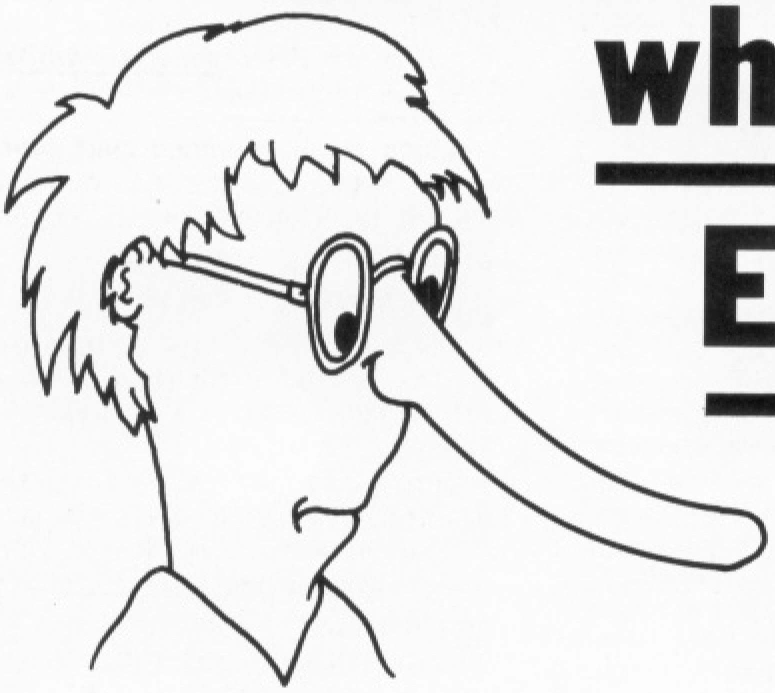
C-H	The monsters' coordinates.
L	Level of difficulty.
X,Y	Your coordinates.
SCREEN	Screen number.
DOTS	Number of dots left.
OK	A flag to show whether you're OK.
NAME$(50)	Names in the high-score table.
HI(5)	High scores.
A(19,14)	A copy of what's on the screen.

```
10 REM *      MAZE MUNCH      *
20 REM * BY ROLAND WADDILOVE *
30 REM *    (C) ATARI USER    *
40 GOSUB 9000:REM Initialise
50 GOSUB 8500:REM Instructions
100 GOSUB 4000:REM Score table
150 GOSUB 5000:REM Draw maze
160 GOSUB 6000:REM Start
200 GOSUB 1000:REM Move man
220 GOSUB 1500:REM Move ghosts
300 IF OK AND DOTS THEN 200
310 IF OK THEN GOSUB 7500
320 IF  NOT OK THEN GOSUB 7000
330 IF LIVES THEN 150
350 GOSUB 4500:REM Hi score
400 GOTO 100:REM Another game
500 END
1000 REM ------ Move Man --------
1060 S=STICK(0):I=X-(S=11)+(S=7):J=Y-(
S=14)+(S=13)
1061 IF I<0 THEN I=I+20
1062 IF I>19 THEN I=I-20
1065 IF A(I,J)=4 THEN Z=USR(1536):DOTS
=DOTS-1:SOUND 0,60,10,8
1070 IF A(I,J)<>3 THEN Z=USR(1604,X,Y,
0,I,J,2):X=I:Y=J:A(X,Y)=0
1080 IF (X=C AND Y=D) OR (X=E AND Y=F)
 OR (X=G AND Y=H) THEN OK=0
1100 SOUND 0,0,0,0
1200 RETURN
1500 REM ----- Move ghosts -----
1550 IF PEEK(53770)>L THEN SOUND 1,0,0
,0:GOTO 1620
1560 I=C+(X>C)-(X<C):IF A(I,D)=3 THEN
I=C
1580 J=D+(Y>D)-(Y<D):IF A(I,J)=3 THEN
J=D
1590 Z=USR(1604,C,D,A(C,D),I,J,1):C=I:
D=J:SOUND 1,121,10,4
1600 IF X=C AND Y=D THEN OK=0
1610 RETURN
1620 IF PEEK(53770)>L THEN SOUND 2,0,0
,0:GOTO 1700
1630 I=E+(X>E)-(X<E):IF A(I,F)=3 THEN
I=E
1640 J=F+(Y>F)-(Y<F):IF A(I,J)=3 THEN
J=F
1650 Z=USR(1604,E,F,A(E,F),I,J,1):E=I:
F=J:SOUND 2,162,10,4
1660 IF X=E AND Y=F THEN OK=0
1670 RETURN
1700 IF PEEK(53770)>L THEN SOUND 3,0,0
,0:RETURN
1710 I=G+(X>G)-(X<G):IF A(I,H)=3 THEN
I=G
1720 J=H+(Y>H)-(Y<H):IF A(I,J)=3 THEN
J=H
1730 Z=USR(1604,G,H,A(G,H),I,J,1):G=I:
H=J:SOUND 3,193,10,4
1740 IF X=G AND Y=H THEN OK=0
1800 RETURN
4000 REM ----- Score table -----
4010 GRAPHICS 2:SETCOLOR 2,0,0:POKE 75
5,0
4020 X=1+PEEK(88)+256*PEEK(89):Y=1
4030 MAZE$=" HIGH SCORES"
4032 FOR I=1 TO 12
4034 POKE X+I,ASC(MAZE$(I,I))+32
4036 NEXT I
4040 X=X+20
4050 FOR I=1 TO 5
4055 POKE (20*I+X),I+16+192
4060 FOR J=2 TO 11
4070 POKE (20*I+J+X),ASC(NAME$(Y,Y))-3
2
4075 Y=Y+1
4080 NEXT J
4082 T$=STR$(HI(I))
4084 FOR J=1 TO LEN(T$)
4086 POKE (20*I+13+J+X),ASC(T$(J,J))-3
2+192
4088 NEXT J
4090 NEXT I
4100 ? "       Press Fire Button"
4200 GOSUB 8000
4210 L=50:LIVES=3:SCREEN=1:POKE 1602,0
:POKE 1603,0
4300 RETURN
4500 REM ----- High scores -----
4505 FOR I=0 TO 3:SOUND I,0,0,0:NEXT I
4510 X=PEEK(40811)-16+10*(PEEK(40810)-
16)+100*(PEEK(40809)-16)+1000*(PEEK(40
808)-16)
4520 IF X<HI(5) THEN RETURN
4530 GRAPHICS 0:SETCOLOR 2,0,0
4540 ? :? :? "Well done, you're in":?
:? "the high score table."
4550 ? :? :? :? "What is your name ";
4560 INPUT T$
4565 IF LEN(T$)<10 THEN T$(LEN(T$)+1)=
"           ":REM 10 spaces
4570 HI(5)=X:NAME$(41)=T$
4600 FOR I=5 TO 2 STEP -1
4610 IF HI(I)<HI(I-1) THEN 4650
4620 T$=NAME$(I*10-9,I*10):NAME$(I*10-
9,I*10)=NAME$(I*10-19,I*10-10)
4630 NAME$(I*10-19,I*10-10)=T$
4640 X=HI(I):HI(I)=HI(I-1):HI(I-1)=X
4650 NEXT I
4800 RETURN
5000 REM ----- Draw maze -----
5005 FOR I=0 TO 3:SOUND I,0,0,0:NEXT I
5008 FOR I=0 TO 100:NEXT I
5010 R=PEEK(53770)
5015 IF R<50 THEN GRAPHICS 7:SETCOLOR
0,3,6:SETCOLOR 1,13,12:SETCOLOR 2,7,6
5020 IF R>49 AND R<100 THEN GRAPHICS 7
:SETCOLOR 0,3,6:SETCOLOR 1,13,12:SETCO
LOR 2,0,6
5025 IF R>99 AND R<150 THEN GRAPHICS 7
:SETCOLOR 0,3,6:SETCOLOR 1,13,12:SETCO
LOR 2,5,4
5030 IF R>149 AND R<200 THEN GRAPHICS
7:SETCOLOR 0,8,6:SETCOLOR 1,13,12:SETC
OLOR 2,3,4
5035 IF R>199 THEN GRAPHICS 7:SETCOLOR
 0,8,6:SETCOLOR 1,13,12:SETCOLOR 2,10,
4
5040 POKE 755,0:RESTORE 5200
5050 FOR J=0 TO 14
5060 READ MAZE$
5070 FOR I=0 TO 19
5080 IF MAZE$(I+1,I+1)="*" THEN K=3:A(
I,J)=3
5090 IF MAZE$(I+1,I+1)=" " THEN K=0
5110 IF MAZE$(I+1,I+1)="." THEN K=4:A(
I,J)=4
5120 Z=USR(1604,I,J,0,I,J,K)
5150 NEXT I
5160 NEXT J
5200 DATA ********************
5210 DATA *........**........*
5220 DATA *.******.**.******.*
5230 DATA *.*    *....*    *.*
5240 DATA *.******.**.******.*
5250 DATA *........**........*
5260 DATA **.***.******.***.**
5270 DATA ...* *........* *...
5280 DATA **.***.******.***.**
5290 DATA *........**........*
5300 DATA *.******.**.******.*
5310 DATA *.*    *....*    *.*
5320 DATA *.******.**.******.*
5340 DATA *........**........*
5350 DATA ********************
5400 RETURN
6000 REM ------- Start --------
6010 C=18:D=1
6020 E=18:F=13
6030 G=1:H=13
6040 Z=USR(1604,C,D,1,C,D,1)
6050 Z=USR(1604,E,F,1,E,F,1)
6060 Z=USR(1604,G,H,1,G,H,1)
6070 X=1:Y=1:A(1,1)=0
6080 Z=USR(1604,X,Y,2,X,Y,2)
6100 ? "Score:                      Hig
h:";HI(1)
6120 ? :? "Screen:";SCREEN;"
     Lives:";LIVES;
6150 OK=1:DOTS=113
6200 RETURN
7000 REM ------ Caught ------
7010 LIVES=LIVES-1
7020 Z=USR(1604,X,Y,1,X,Y,1)
7030 SOUND 1,0,0,0:SOUND 2,0,0,0:SOUND
 3,0,0,0
7040 FOR I=100 TO 255 STEP 2
7050 SOUND 0,I,10,4:SOUND 1,I/2,10,3:S
OUND 2,I/4,10,2:SOUND 3,300-I,10,1
7060 NEXT I
7200 RETURN
7500 REM ------ Cleared maze -----
7510 FOR I=0 TO 200:NEXT I
7520 SCREEN=SCREEN+1:L=L+20
7600 RETURN
8000 REM ---------- Tune ---------
8040 J=1:SOUND 2,193,10,3
8050 RESTORE P(J):SOUND 1,C(J),10,4:IF
 J=9 THEN J=0
8070 READ I:IF I=0 THEN J=J+1:GOTO 805
0
8080 SOUND 0,I,10,10
8100 IF PEEK(20)<6 THEN 8100
8110 POKE 20,0:IF STRIG(0) THEN 8070
8120 RETURN
8200 DATA 85,96,76,96,72,96,64,76,96,6
4,76,96,64,76,0
8220 DATA 64,72,57,72,53,72,47,57,72,4
7,57,72,47,57,0
8240 DATA 64,57,72,64,76,72,85,76,96,8
5,96,102,114,128,144,153,173,193,173,1
53,144,128,114,102,0
8500 REM ----- Instructions -----
8510 GRAPHICS 2:POKE 755,0
8515 SETCOLOR 2,8,0:SETCOLOR 4,8,0
8520 MAZE$="MAZE MUNCH"
8530 X=64+PEEK(88)+256*PEEK(89)
8540 FOR I=1 TO 10
8550 POKE X+I,ASC(MAZE$(I,I))-32
8560 NEXT I
8565 ? "                Atari  User"
8570 ? :? :? "            Press Fire But
```

```
ton";
8575 GOSUB 8000
8580 GRAPHICS 0:SETCOLOR 2,8,0:SETCOLO
R 4,8,6:POKE 755,0
8585 POSITION 9,2:? "M A Z E    M U N
C H"
8590 ? :? :? "Hungry Horace has entere
d the maze    monster's den in search
of munchy"
8600 ? "morsels left after the great f
east."
8610 ? :? "These tasty titbits are a d
iner's     delight and sought by all t
he Blob    creatures."
8620 ? :? "Can you help Horace collect
 these     crumbs? Be careful though,
the maze"
8630 ? "monsters will make a meal of y
ou if   they catch you!"
8640 ? :? :? :? "Press Fire button..."
8700 GOSUB 8000
8800 RETURN
9000 REM ----- Initialise -----
9005 POKE 755,0
9006 RESTORE 9800:FOR I=0 TO 187:READ
J:POKE 1536+I,J:NEXT I
9010 RESTORE 9080
9020 DIM MAZE$(20),A(19,14),P(9),C(9),
NAME$(50),HI(5),T$(10)
9025 FOR I=1 TO 5:NAME$(I*10-9,I*10)="
ATARI USER":HI(I)=600-100*I:NEXT I
9040 FOR I=1 TO 9:READ J:P(I)=J:READ J
:C(I)=J:NEXT I
9080 DATA 8200,173,8200,173,8220,230,8
220,230,8200,173,8200,173,8220,230,822
0,230,8240,128
9090 FOR I=0 TO 49
9094 READ J:POKE 1724+I,J
9096 NEXT I
9100 DATA 0,0,0,0,0,0,0,0,0,0
9110 DATA 5,80,25,100,23,212,31,244,18
,132
9120 DATA 10,160,38,152,42,168,43,232,
10,160
9130 DATA 255,255,192,3,197,83,192,3,2
55,255
9140 DATA 0,0,0,0,2,64,0,0,0,0
9200 RETURN
9300 DATA 255,63,255,63,0,0,21,85,21,8
5
9310 DATA 15,255,63,253,255,245,85,84,
85,80
9800 DATA 104,248,24,173,67,6,105,5,14
1,67,6,173,66,6,105,0,141,66,6,216
9810 DATA 74,74,74,74,24,105,16,141,10
4,159,173,66,6,41,15,24,105,16,141,105
9820 DATA 159,173,67,6,74,74,74,74,24,
105,16,141,106,159,173,67,6,41,15,24
9830 DATA 105,16,141,107,159,96,66,67,
104,104,104,133,212,104,104,133,213,10
4,104,32
9840 DATA 92,6,104,104,133,212,104,104
,133,213,104,104,24,240,8,170,169,0,10
5,10
9850 DATA 202,208,251,105,188,133,214,
169,6,133,215,166,212,164,213,165,88,1
33,212,165
9860 DATA 89,133,213,152,240,15,165,21
2,105,200,133,212,165,213,105,0,133,21
3,136,208
9870 DATA 241,138,10,101,212,133,212,1
65,213,105,0,133,213,162,5,160,0,177,2
14,145
9880 DATA 212,200,177,214,145,212,230,
214,230,214,136,165,212,24,105,40,133,
212,165,213
9890 DATA 105,0,133,213,202,208,226,96
```

Tired of typing?
Take advantage of our finger-saving offer on Page 61.

EOR – A way to find out who's telling the Exclusive truth



MIKE BIBBY continues his series on binary numbers

IN the last article we looked at the AND and OR operations on binary numbers – logical operations, as they are known. These were simply rules for combining numbers bit by bit. We shall continue our exploration this month with a look at the EOR operation.

EOR stands for Exclusive OR – sometimes people call it XOR. Either way it's the same thing. EOR is a variant on the way we normally use the term OR.

For example, if I say:

Mike OR Pete wears glasses

this is true if Mike wears glasses, OR Pete wears glasses, OR both Mike *and* Pete wear glasses.

Now it's this last case of OR we're interested in, where they both wear glasses. EOR works just like OR up to this point. However, EOR does not "allow" both of them to wear glasses. Either one does, or the other, but not both.

To put it another way, the one who wears the glasses does so *exclusively.*

If both are wearing glasses then while:

Mike OR Pete wears glasses

would be true,

Mike EOR Pete wears glasses

would be a downright lie!

We could signify that a statement is true with the letter T, and use F for false. At school our teachers used ticks for truth and crosses for false. Since we're using computers, though, we'll use numbers: 1 will denote true and 0 will denote false. We've chosen 1 and 0 because they fit in so well with the binary system.

So, in the above example, if Mike has glasses we can give Mike the value 1. If Pete hasn't glasses we can give Pete the value 0. Table I shows the idea, applied to each combination of spectacle user. The ones and zeros are known as truth values, states or conditions.

As you can see, there are four possible cases as far as Mike and Pete wearing glasses are concerned: neither can wear them as in case 1, where both Mike and Pete has 0 value.

Then again, Pete may wear them (1) whereas Mike does not (0), case 2, and so on.

If you look carefully at the numbers involved in all four cases, you see that we've got four pairs of bits we can combine. Each pair of bits is made up of the "truth bit" for Mike and the "truth bit" for Pete.

What I've done in Table II is to combine these pairs for all four cases in accordance with our OR rules. We've stored the result in a third

	Wears glasses Mike	Wears glasses Pete	
Case 1	0	0	neither wears glasses
Case 2	0	1	Pete wears glasses
Case 3	1	0	Mike wears glasses
Case 4	1	1	Both wear glasses

Table I

Mike wears glasses	Pete wears glasses	Mike OR Pete wears glasses
0	0	0
0	1	1
1	0	1
1	1	1

Table II

Mike wears glasses	Pete wears glasses	Mike AND Pete wears glasses
0	0	0
0	1	0
1	0	0
1	1	1

Table III

column.

We call such a table a Truth Table. In this case, it's the truth table for OR. We can use it to work out the result for any OR combination of two bits. All we have to do is to find the row that starts with the two bit values we're combining and then look in the third column for the result.

Table III shows a similar table for:

Mike AND Pete wear glasses

Again the first two columns are identical, covering all four possible cases. The third column combines them according to the AND rules.

Look again at Table II. This corresponds in a sense to our binary rule for OR: you get a 1 if either or both bits you combine contain a 1.

However if when talking about Mike and Pete you mean OR in the exclusive sense, EOR, then the combination of Mike wearing glasses and Pete also wearing glasses would have to be false. This is because EOR means either one or the other wears glasses, but not both – it's *exclusively* one or the other.

If we do mean EOR in this exclusive sense we'd write our statement about them as:

Mike EOR Pete wears glasses

Its Truth table is given in Table IV:

Mike wears glasses	Pete wears glasses	Mike EOR Pete wears glasses
0	0	0
0	1	1
1	0	1
1	1	0

Table IV

If you look at each case, you'll see that the only time Mike EOR Pete is true is when either one or the other wears glasses, but not both (or neither).

More formally, if both bits are 0, or both bits are 1 the result is 0. If either is 1 and the other is 0 the result is 1.

To put it another way, if the bits are identical the result is 0, otherwise the result is 1.

Let's have a look at how we EOR binary pairs of numbers. It's the same as for OR and AND – just apply the rules for EORing to each pair of bits in succession. For example:

```
         %10110110
EOR      %11100101
gives    %01010011
```

Take a look at what happens when you EOR a number with zero:

```
         %10110110
EOR      %00000000
gives    %10110110
```

that is, when you EOR a number with zero it leaves that number unchanged. Also something interesting happens when you EOR a number with itself:

```
         %10110110
EOR      %10110110
gives    %00000000
```

Whenever you EOR a number with itself, the result is zero. This is as it should be: remember, when you EOR two identical bits the result is zero.

Now EOR has a property which makes it quite useful – let's look what happens when we take a number, EOR it with a second number and then go on to EOR the result once more with that second number.

```
First number          %10101101
Second number    EOR  %01101000
Result                %11000101
Second number    EOR  %01101000
Final result          %10101101
```

As you can see, the first number has magically re-appeared! This always happens when you EOR twice with the same number as, in a sense, the two EORings cancel each other out.

Table V summarises the process for all four possible pairs of one-bit numbers. As you can see, for all the cases the final resulting bit (when the first bit has been EORed twice with the second) is identical to the first bit.

Another way to think of it is that we are doing:

first number EOR <u>second number EOR second number</u>

Taking the underlined part first, we've already seen that any number EORed with itself gives a zero result. So what we're really doing is:

first number EOR 0

which, as we've also seen, must leave just the first number, since EORing with zero leaves a number unchanged.

All this may seem rather abstruse, but actually it's quite useful. In fact we tend to use AND, OR and EOR quite often in graphics, particularly in animation.

To simulate movement we frequently print something on the screen, then after leaving it there for a while to register on the eye, we blank it out and print it in a new position and so on.

Sometimes we blank the character out by printing it again in the same place but in the background colour.

We can, however, use EOR. If we use EOR to place our character on the screen – never mind exactly how for the moment – when it comes to wanting rid of it, we can just repeat ourselves.

That is, we just EOR the character on again. As we've seen, the effect of two EORs is to cancel each other out. In this case, they cancel out to the original background – and the character disappears.

The point is, logical operators, as AND, OR and EOR are known, can be invaluable to both the Basic and machine code programmer.

● *Next month we'll take a brief look at the idea of masks.*

First bit	Second bit	Result 1st EOR	Second bit again	Result 2nd EOR
0	0	0	0	0
0	1	1	1	0
1	0	1	0	1
1	1	0	1	1

Table V

A money-saving special offer from ATARI USER



Price includes VAT, post & packing

THIS is your passport into the exciting world of telecomputing!

IT'S by far the fastest growing field in micro-computing. All over the world micros are talking to each other over the telephone line. As well as to the ever-increasing number of public and private databases, bulletin boards – and even giant mainframe computers.

We want all *Atari User* readers to share in the new technology that makes all this possible. So we're offering a unique starter pack at an unbeatable price. It gives you everything you need to get in touch with the big wide world outside:

- **Modem**
- **Software**
- **Serial Interface**

The modem is the amazing Miracle Technology WS2000. One of the most powerful on the market, it provides all the facilities you require. Yet it's simplicity itself to use. Just plug it into a standard British Telecom jack and you're away!

The package also features the superb Datari serial interface, which links the modem directly to the Atari's peripheral port without the need for the 850 serial interface.

The best hardware deserves the best software to drive it, and with the specially written Multi-Viewterm program the package is complete. It supports all the standard baud rates – 1200/75, 75/1200, 1200/1200 and 300/300 full duplex.

Your *Atari User* package will allow you to talk directly to other computers, to send your own telex messages, to go tele-shopping – even to download free software programs directly into your Atari.

You will be able to join Micronet/Prestel, which will immediately open up to you a vast menu of 750,000 pages of information – instant world news, sports, holidays, hotels, train and airline timetables, all regularly updated.

And you can become one of a growing number of enthusiasts who are joining MicroLink, the giant database set up in conjunction with Telecom Gold, which is described more fully in this issue.

But first, send for the Miracle package – and enter the fascinating, limitless world of communications!

Use the order form on Page 61



What it offers the Atari user...

Give your micro mainframe power

With MicroLink your micro becomes a terminal linked directly to the Telecom Gold mainframe computer, and able to tap its tremendous power and versatility. Right away you'll be able to use giant number-crunching programs that can only run on a mainframe. You can set up your own computerised filing systems, store and update statistics and other information, cross-reference material between files, selectively extract the information you want, perform massive calculations and design reports to display information from any of the files and in any format you choose.

The biggest bulletin board of them all

The number of bulletin boards is growing rapidly. New ones are springing up in all parts of Britain and all over the world, with people of like minds chatting to each other on all manner of subjects. The only snag is that the vast majority are single-user boards – which means lots of other people are also trying to make contact and all too often all you get is the engaged tone. But with the MicroLink bulletin board there is no limit to the number of people using it at the same time. And no limit to the number of categories that can be displayed on the board.

We're only a local phone call away

More than 96 per cent of MicoLink subscribers can connect to our mainframe computer in London by making a local phone call. This is possible because they use British Telecom's PSS system, which has access points all over Britain. A local phone call is all you need, too, for access to the international Dialcom system through MicroLink.

Telemessages – at a third of the cost

The modern equivalent of the telegram is the telemessage. Send it before 10pm and delivery is guaranteed by first post the following day (except Sunday). The service was intended for people phoning their message to the operator, and it costs £3.50 for 50 words. But you can now use it via MicroLink for only £1.25 for up to 350 words!

Send and receive telex messages

With MicroLink you can turn your micro into a telex machine, and can send and receive telex messages of any length. You will be able to communicate directly to 96,000 telex subscribers in the UK, 1½ million worldwide – and even with ships at sea via the telex satellite network. Business people can now send and receive telexes after office hours, from home or when travelling. You can key in a telex during the day and instruct MicroLink not to transmit it until after 8pm – and save 10 per cent off the cost!

The mailbox that is always open

MicroLink is in operation 24 hours a day, every day. That means you can access your mailbox whenever you want, and from wherever you are ... home, office, airport – even a hotel bedroom or golf club! No-one needs to know where you are when you send your message.

What does it all cost?

Considering all the services you have on tap, MicroLink is remarkably inexpensive. You pay a once-only registration fee of £5, and then a standing charge of just £3 a month. On-line costs are 3.5p a minute (between 7pm and 8am) or 10.5p a minute during office hours. There is an additional 2p a minute PSS charge if you are calling from outside the 01- London call area. Charges for telex, tele-messages and storage of files are given on the next page.

How much it costs to use MicroLink

Initial registration fee: £5.

Standing charge: £3 per calendar month or part.

Connect charge: 3.5p per minute or part – cheap rate; 10.5p per minute or part – standard rate.

Applicable for duration of connection to the Service. Minimum charge: 1 minute. Cheap rate is from 7pm to 8am, Monday to Friday, all day Saturday and Sunday and public holidays; Standard rate is from 8am to 7pm, Monday to Friday, excluding public holidays.

Filing charge: 20p per unit of 2,048 characters per month.

Applicable for storage of information, such a telex, short codes and mail files. The number of units used is an average calculated by reference to a daily sample.

Information Databases: Various charges.

Any charges that may be applicable are shown to you before you obtain access to the database.

MicroLink PSS service: 2p per minute or part (300 baud); 2.5p per minute or part (1200/75 baud).

Only applies to users outside the 01- London call area.

Telex registration: £10.

Outgoing telex: 5.5p per 100 characters (UK); 11p per 100 (Europe); 16.5p per 100 (N. America); £1.15 per 400 (Rest of world); £2.75 per 400 (Ships at sea).

Deferred messages sent on the night service are subject to a 10 per cent discount.

Incoming telex: 50p for each correctly addressed telex delivered to your mailbox. Obtaining a mailbox reference from the sender incurs a further charge of 50p.

It is not possible to deliver a telex without a mailbox reference. If a telex is received without a mailbox reference the sender will be advised of non-delivery and asked to provide a mailbox address. Each user validated for telex and using the facility will incur a charge of 6 storage units a month. Further storage charges could be incurred depending on the amount of telex storage and the use made of short code and message file facilities.

Telemessages: £1.25 for up to 350 words.

Radiopaging: No charge.

If you have a BT Radiopager you can be paged automatically whenever a message is waiting in your mailbox.

International Mail: For the first 2,048 characters – 20p to Germany and Denmark; 30p to USA, Australia, Canada, Singapore, Hong Kong and Israel. For additional 1,024 characters – 10p; 15p.

These charges relate to the transmission of information by the Dialcom service to other Dialcom services outside the UK and the Isle of Man. Multiple copies to addresses on the same system host incur only one transmission charge.

Billing and Payment: All charges quoted are exclusive of VAT. Currently all bills are rendered monthly.

Software over the telephone

MicroLink is setting up a central store of software programs which you'll be able to download directly into your micro. The range will include games, utilities, educational and business programs, and will cover all the most popular makes of micros.

Talk to the world – by satellite

MicroLink is part of the international Dialcom network. In the USA, Australia and a growing number of other countries there are many thousands of users with electronic mailboxes just like yours. You can contact them just as easily as you do users in Britain – the only difference is that the messages from your keyboard go speeding around the world via satellite.

What you need to access MicroLink

You must have three things in order to use MicroLink: a computer (it can be any make of micro, hand-held device or even an electronic typewriter provided it has communications facilities), a modem (it can be a simple Prestel type using 1200/75 baud, or a more sophisticated one operating at 300/300 or 1200/1200 baud), and appropriate communications software.

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☐☐ 19 ☐☐

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I/We authorise you until further notice in writing to charge to my/our account with you on or immediately after 15th day of each month unspecified amounts which may be debited thereto at the instance of British Telecommunications plc – TELECOM GOLD by Direct Debit. Bills are issued 10 days before debit is processed.

Name of Account to be debited

Account Number

B. Please debit my/our Access/Visa account number

I/We authorise you until further notice in writing to charge to my/our account with you on or immediately after 15th day of each month unspecified amounts which may be debited thereto at the instance of British Telecommunications plc – TELECOM GOLD. Bills are issued 10 days before charge is applied to your account.

C. Please invoice the company/authority.

(✓) ☐ If you select this option, which is ONLY AVAILABLE to government establishments and public limited companies, you will be sent an authorisation form for completion which will require an official order number to accept unspecified amounts.

Screen dumps with the Atari

WHAT a wonderful company Atari is turning out to be since J.T. took over a while ago. Just look at the range of disc drives, modems, monitors, computers, printers and so forth that are on offer today.

After swapping my good and trusty 800 for a 130XE recently, which was a bit of a wrench, I decided to go the whole hog and increase my collection of Atari paraphernalia by one printer. The problem was, which one?

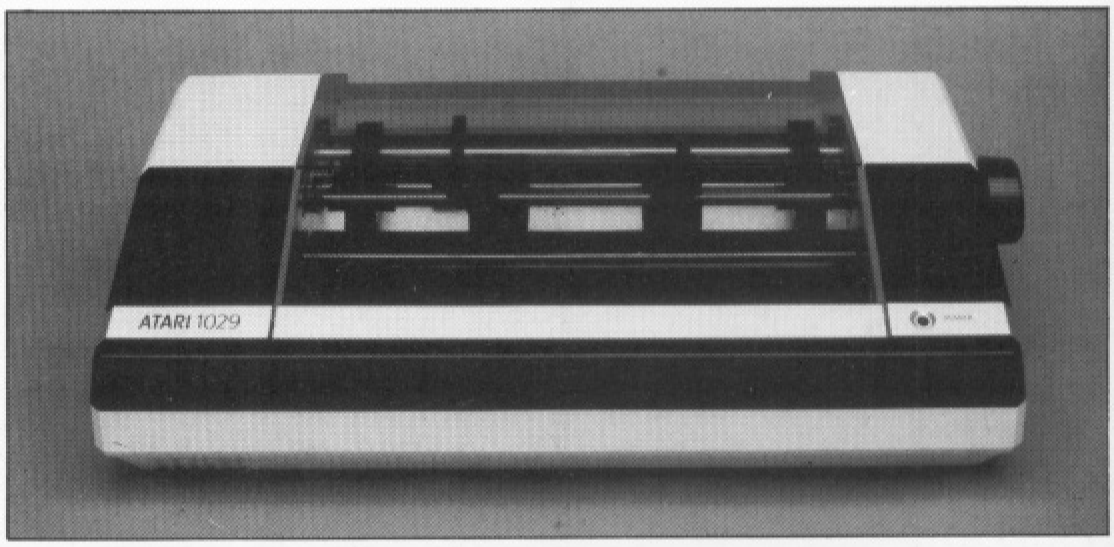
There were a number of choices, of course, from the Atari range of printers to Epson, Alphacom and Star, to name but a few.

In the end I decided to stick to the company known and loved so long. Why? Well, how about because they plug straight into the back of your computer without the need for an extra interface?

But which one should I go for? Should it be the letter quality 1027? No, lacking graphic ability. What about the 1020 or the 1025, 1029?

In the end I decided upon the new 1029, It's inexpensive at under £200. It is capable of printing five or 10 characters per inch and graphics among other things as well as looking very nice.

Anyway, off I went, cash in hand, and arrived home with the beast a while later. After reading through the instruction book a few times I must



confess that I was a little disappointed that I could not dump a screen to the printer straight away.

Why, do I hear you ask?

Well, the 1029 is a dot matrix printer with a single printed line of seven dots high by 480 dots across.

Only seven dots high? Then how do you print characters?

When in graphics mode, imagine seven lines high by one line wide. That's what you have to print to. The bottom line has the value of 1, the next line up 2, then 4, 8, 16, 32 and finally 64 for the top line.

That's right – no 128.

So if you want a single dot on the bottom line and a single dot on the top line you print CHR$(65). See, 1 for the bottom plus 64 for the top.

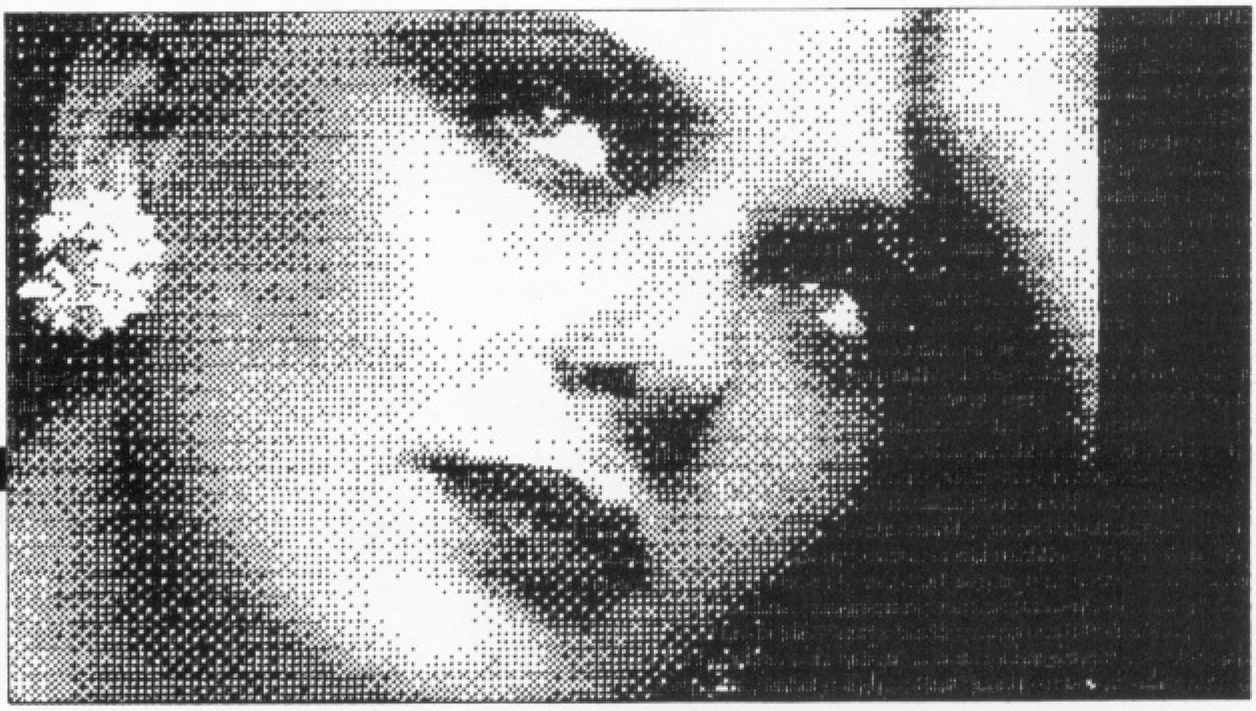
Now take this one step further. Try to convert the top seven lines of

Program I

```
19950 REM Subroutine to print a GR.8
19960 REM screen to the Atari 1029
19970 REM seven pin printer.
19980 REM Routine by Mick <plod> King
19990 REM
20000 SCREEN=PEEK(88)+256*PEEK(89):IOC
B=1:IF OFFSET>160 OR OFFSET<0 THEN OFF
SET=0
20010 ON PEEK(1570)=6 GOTO 20020:RESTO
RE 20040:FOR I=0 TO 171:READ A:POKE 15
36+I,A:NEXT I
20020 FOR PR=0 TO 27:CLOSE #IOCB:OPEN
#IOCB,8,0,"P:":? #IOCB;CHR$(27);"9";CH
R$(27);"A";CHR$(1);CHR$(64+OFFSET);
20025 ON OFFSET=0 GOTO 20030:FOR I=1 T
O OFFSET:? #IOCB;CHR$(0);:NEXT I
20030 DUMMY=USR(1536,IOCB,SCREEN):SCRE
EN=SCREEN+280:NEXT PR:RETURN
20040 DATA 104,104,104,10,10,10,10,141
,182,6,104,141,173,6,104
20050 DATA 141,172,6,169,0,141,183,6,3
2,54,6,24,173,94,6,105,1,141,172,6,173
20060 DATA 95,6,105,0,141,173,6,238,18
3,6,173,183,6,201,40,208,226,96,162,0,
24
20070 DATA 173,173,6,157,95,6,173,172,
6,157,94,6,105,40,141,172,6,173,173,6,
105
20080 DATA 0,141,173,6,24,138,105,6,17
0,224,37,144,221,162,0,14,255,255,62,1
74,6
20090 DATA 14,255,255,62,174,6,14,255,
255,62,174,6,14,255,255,62,174,6,14,25
5,255
20100 DATA 62,174,6,14,255,255,62,174,
6,14,255,255,62,174,6,232,224,8,208,20
9,174
20110 DATA 182,6,169,11,157,66,3,169,1
74,157,68,3,169,6,157,69,3,169,0,157,7
3
20120 DATA 3,169,8,157,72,3,32,86,228,
96
```

Program II

```
10 GRAPHICS 24
20 FOR I=0 TO 319 STEP 5
30 COLOR 1:PLOT I,0:DRAWTO 319-I,191:N
EXT I
40 FOR I=191 TO 0 STEP -4
50 PLOT 0,I:DRAWTO 319,191-I:NEXT I
60 GOSUB 20000
70 END
```



By MICHAEL KING

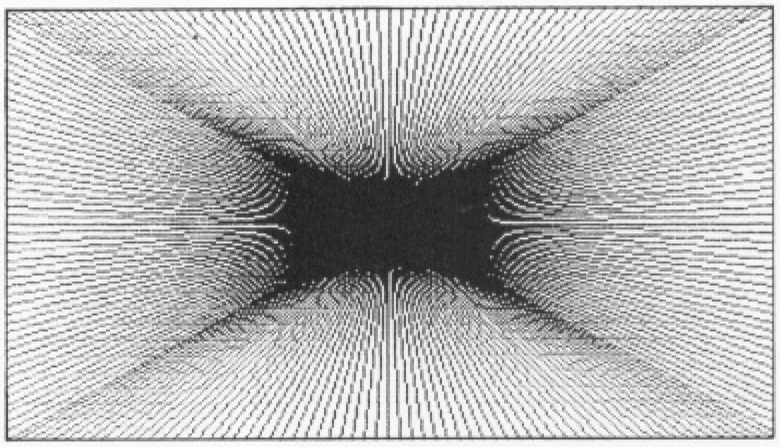


Figure I: Printout made by using Programs I and II together

screen information, standard 8 bit horizontal bytes, to the 7 bit vertical bytes understood by the 1029. That's a lot of bit manipulation if you want to print out a whole screen.

Well, for all of you who have been out and parted with your well-earned cash for the 1029, look no further. Type in Program I and save it to disc before putting it to use.

This is only a subroutine, and must be used together with your own program to set up your own picture screen.

If you would like an example, type in Program II, which will set up a graphics 8 screen with a basic design scribbled all over it – see Figure I.

Just set the variable OFFSET to a value between 0 and 160. This is the offset of the picture on the paper left to right.

If you wish your masterpiece to occupy the left edge of the paper, then set OFFSET to 0, or to occupy the right side of the paper set it to 160. But for a centered picture, rather nice, OFFSET should be 80.

Ensure your 1029 is on and type RUN. The whole screen will be dumped to the printer.

PROGRAM STRUCTURE

20000 Finds the screen address, sets the variable IOCB to use the IOCB number 1 and checks to see if OFFSET is within the range 0 to 160.

20010 Uses a little trick that gives Atari Basic an IF . . . THEN . . . ELSE command. If PEEK(1570)=6 (converter loaded) THEN control will be passed to line 20020 ELSE the rest of line 20010 will be acted upon and the converter will be read into page 6.

20020 Start of the loop that opens the printer and prints the line headers to the printer.

20025 There's that ON GOTO trick again. Prints the OFFSET number of blank pixels to the paper.

20030 The USR call. Also adds 280 (7 * 40) to the variable SCREEN to give us the next printable line.

The rest of the program is the data for the converter.

Addressing modes of the 68000 microprocessor



In Part II of his series examining the powerful 68000 chip at the heart of the Atari ST, MIKE COOK examines its versatile addressing modes

LAST month we looked at the instruction set of the 68000 microprocessor. And, just as man cannot live by bread alone, neither can a microprocessor live by instruction alone.

What gives an instruction set its power is the addressing modes associated with it.

This is because an instruction identifies the operation to be performed – such as add and subtract – but the addressing mode explains where the operation is to be performed.

The best instruction set in the world is no good without a variety of addressing modes.

Basically the action of an instruction can be based in one of two places – either an on-chip register or an off-chip memory location.

There are two different types on on-chip registers in the 68000. These are the address registers and the data registers. Off-chip memory can be specified with a 32 bit address although only 24 bits are used in the 68000.

Registers can be thought of as temporary storage to be used while bit patterns are being manipulated, whereas off-chip memory is used for more permanent data as well as storing the program and accessing the hardware.

So why do we need different types of addressing mode? The answer is to cope with different programming problems.

The best way to understand the different modes is to look at each in turn and see how they can help us.

First, the form most assemblers use when handling address information for this processor. This consists of three basic parts –

- The instruction mnemonic and length of operation – byte, word, long word.
- The source – where the data is to be taken from.
- The destination – where the result is to be placed.

The art of programming is to tie these three things together to perform as you want without tying yourself in knots.

The manner in which the source and destination are specified is known as the addressing mode. This calculates an address which is known as the effective address. It is this effective address that is used.

Let's take the simplest addressing mode, that of Register Direct.

This simply uses the registers to hold the data. For example, if you wanted to move the data from data register D3 to address register A5, you would use the register direct addressing mode for both source and destination.

Assemblers might differ in syntax, but typically the form would be:

```
MOVE.W    D3,A5
```

which means move the word – 16 bits – FROM data register 3 TO address register 5.

In fact there are two variants of the same mode being used here. They are Data Register Direct for the data register and Address Register Direct for the address register.

The Address Register Direct addressing mode is used mainly in the housekeeping parts of a program or to operate on temporary storage areas.

Now in order to write any type of program you need to be able to cope with constants, even if only to set up the initial value of a variable.

A constant is a value that is known at the time you write the program – we say that it is "known at compile time".

So when the assembler turns all the mnemonics into the binary bit patterns of machine code instructions, the number we want to use is known.

What happens is that the assembler places these numbers alongside the instructions in the body of the program. The values to use follows immediately after the instruction.

Hence the name of Immediate Data Addressing. Its main use is to initialise counters or variables. For example, suppose we want to set up

data register D1 with the value 9 we would write:

MOVE.B #9,D1

that is, move the byte – 8 bits – into data register D1. The # before the number tells the assembler to treat what follows as an immediate decimal value.

In fact there are two types of immediate addressing mode – Immediate and Quick Immediate. The quick mode incorporates the value into the instruction, whereas the normal mode adds the value at the end of the instruction bytes.

Only limited number values can be used with the quick mode, but any assembler worth its salt will choose the quick mode if the numbers are within the restricted range.

Therefore you do not have to worry too much about the difference between them.

To handle a variable you must be able to access off-chip memory. Most of the time you know what address you want to use, just as in a high level language you know what name the variable is. We say the address is known at compile time.

To do this you can use the Direct Memory Addressing mode. This takes a value and compiles it next to the instruction just like the immediate mode. The difference is that when the number is used it is taken not as a value but as the address where a value is to be found.

For example, to move the value in memory location 8 into data register D4 you would use:

MOVE.B &8,D4

where $ indicates that what follows is the hexadecimal value of the memory address from which to take the data.

Again there are two types of this addressing mode – Absolute Short and Absolute Long. The difference lies in how many extra bytes are used to specify the address.

Basically, the short mode is used when you want to address the first or last 32k or memory – where you can get away with specifying the address in two bytes – otherwise you need the long mode which specifies the address in four bytes. Again, any semi-decent assembler should choose the correct one for you.

In many cases the address of a variable is not known at compile time.

This may be where you want to apply the same operation to many different variables. In high level languages you would use an array with a fixed name and a variable subscript. In machine code you would use a form of indirect memory addressing of which there are five different variants.

Indirect Memory Addressing is therefore the most complicated of the addressing modes.

The simplest of this complex bunch is the Register Indirect mode.

In this mode a register holds not the value but the address of a value. We say that the register points to a memory location. of course before this mode is used the register must be set up to point to the area you want.

For example, suppose we wanted to clear a section of memory. Then we could set up the address of the start of our section in memory in address register A0 and then perform:

MOVE.B #0,(A1)

The brackets indicate not to use the register itself as the destination but what the register points to.

We can then increment the register, jump back and perform the same instruction. This time we clear the second byte of our memory.

We can add a constant on to the value in a register by using the Register Indirect with Displacement Addressing mode. This allows you to access memory locations up to 32k either side of that pointed to by the register.

This can be useful if we want to access a particular element of an array whose address is variable.

Note that the displacement can be zero, in which case the addressing mode would be in effect the same as the simple register indirect mode. To indicate this it is usual to place the displacement outside the brackets, so:

MOVE.B #0,#6(A1)

which clears the byte six locations away from that pointed at by the address register.

Perhaps the most complex addressing mode of all is Register Indirect with Displacement and Index.

This works like Register Indirect with Displacement but with the addition of another value. The effective address is the sum of the displacement, the contents of an address register and the contents of a data register – the index bit. When all three have been added the result defines the location to use.

As it is quite a complex mode, any example to illustrate it is going to be complex, but here is one case where I have used this mode in anger.

I had a digitised picture and I wanted to count how many pixels I had of each brightness level. So I set up an address register (A3) to point at the start of an array whose elements were the brightness levels and whose contents were the number of pixels at that level.

I then put the pixel brightness level into a data register (D3) and performed:

ADD.B #1,#0(A3,D2)

This added the value 1 to the memory pointed at by the sum of A3 and D2.

The displacement was not needed and so could be zero. As there were many such arrays in my system, once A3 was primed with the correct value the same code could be used for all arrays.

There are two more modes in this section – Post-increment Register Indirect and Pre-decrement Register Indirect. They are quite a mouthful but basically are variants of the simple form of indirect addressing.

One mode *increments* the actual register *after* performing the operation, and the other mode *decrements* the register *before* performing the operation.

These two modes are usually used together to form a push-down stack in memory. As any of the address registers can be used in this mode it gives us up to eight different stacks. This allows us to pass parameters to subroutines on stacks. This is just what is needed when implementing the high-level language Forth.

Basically, to push data from D0 on to a stack pointed at by A5 you

would use:

MOVE.L D0,–(A5)

To recover the data back into D2 then:

MOVE.L +(A5),D2

As you can specify byte, word or long word operations the increment sizes are one, two and four respectively. This also allows you to process an array or string a single element at a time.

Relative addressing does not mean "Dear Aunty Flo" but is a way of specifying an address relative to the instruction in the program.

I am sure you have played Monopoly and received the card "Go back three places". Well, that is relative addressing, your destination depends upon where you are.

In most processors this is reserved for program branching, but in the 68000 it can be used with many different instructions.

The purpose of this is to enable you to write code that is position independent. That means that the code can run when placed anywhere in memory. This is necessary in overlay systems where memory to run programs is dynamically allocated by a memory allocation program.

Code can be moved in from disc to an area of memory when needed. It can then stay in the memory after use unless some other program needs more space in which case it is purged (removed).

As the free memory – known as a heap – is always changing it is essential that programs must be position independent.

There are two types of relative addressing – one that specifies a displacement and one which uses an index value as well as a displacement.

Normally you will access these through labels in your assembler program and the assembler will look after calculating the displacements at compile time.

The final addressing mode is the simplest one – Implied Register Addressing. The register to use is specified in the instruction. This is a catch-all mode for those instructions that alter the status register, program counter or stack pointer.

The register to use is part of the instruction itself, so will not trouble you further.

Mastering the addressing modes is 90 per cent of being a good machine code programmer and sound knowledge of what each one does is essential. As you can see, the 68000 provides a comprehensive collection of addressing modes which can be used as both source and destination in many instructions.

● *Next time we will look at the overall environment the 68000 presents to the programmer.*

LOGO IS AN EXTENSIBLE LANGUAGE says DEREK RADBURN

WORDS and lists are what makes Logo tick. They may not be as well known as turtle graphics, but it is worth remembering that turtle graphics was developed in a word and list environment.

In Atari Logo almost all aspects of list processing are present, the exceptions being TEXT and DEFINE. The purpose of this article is to show something of what is possible in Logo, using words and lists.

To begin with, Logo is an extensible language. You can make the system larger and more powerful. I will illustrate what I mean by looking at its conditional test.

Logo's test is one found in many programming languages, the IF condition true THEN do this and, optionally, ELSE do this. Let's illustrate this:

```
TO ENTER
  TYPE [What shape do you want? (S or
    T)] MAKE "KEY RC
  IF NOT OR :KEY = "S :KEY = "T [PRINT
    [You must respond with S or T]
    WAIT 50 ENTER]
END
```

All that this very trivial procedure does is to ask for some input, create a variable called KEY to hold the response, and then test the value of that variable to ensure that it's what is asked for.

There are several things to note about this. First, in this example the THEN branch is a list and the optional ELSE list is not present.

Second, input is handled by RC, ReadCharacter, which always outputs a single character word. Notice also the use of TYPE instead of PRINT – can you work out why?

Third, by using OR it is possible for IF to check two conditions and output true if either is found.

It is possible for OR to take more than two inputs. To do this, OR has to be preceded by a parenthesis, (, and the list of conditions terminated by a closing parenthesis,).

When a Logo primitive, which normally takes two inputs, is used in this way with more than two inputs, it's known as a "greedy procedure".

These might make writing procedures easier, but they have their price when things go wrong – error messages tend to be misleading.

Now one thing which is useful to have is a conditional test which allows an action to be carried out once before a test is invoked. The structure for this is DO action UNTIL condition. It is quite easy to write such a test in Logo.

```
TO DO :ACTION :CONDITION
  RUN :ACTION
  IF RUN :CONDITION [STOP]
  DO :ACTION :CONDITION
END
```

DO takes two lists as its inputs. Let's put it to use:

```
TO SPINSQ
  DO [SQ RT 27]
END

TO SQ
  REPEAT 4 [FD 50 RT 90]
END

TO MOREP
  TYPE [Again?\ ] MAKE "KEY RC
  IF NOT :KEY = "Y [OP "TRUE] [OP
    "FALSE]
END
```

Notice here the use of the backslash. This stops the Logo interpreter from processing the character following it.

Another point to note is the use of NOT in the IF test.

Finally, OP is short for OutPut which causes the procedure to terminate, sending back the item following OutPut to the calling procedure or command level – toplevel.

The DO procedure is an example of tail recursion. Recursion is a process which often gives problems in getting to grips with understanding it. Essentially, recursion exists in ordinary everyday life.

Think about walking:

```
TO WALK
  MOVE OPPOSITE FOOT IN FRONT OF OTHER
  WALK
END
```

I do not suggest you type this into your Atari, but it does, I suggest, put a Logo type of form to an everyday recursive activity.

As you have probably noticed, the particular quality of a recursive procedure is that it has, as part of its definition, a call to itself.

This is not the same as a REPEAT loop. Recursion produces many images and uses a lot of memory. The REPEAT loop does not.

Often, in explanations of Logo, recursion is used to do trivial things in turtle graphics where the use of the REPEAT loop would be far more appropriate and economical.

Here is an example of recursion being used to manipulate a word or

> **The Logo system sees words and lists as being very different**

list, together with some new Logo commands:

```
TO REV :OBJECT
  IF EMPTYP :OBJECT [IF WORDP :OBJECT
    [OP " ] [OP []]]
  IF WORDP :OBJECT [OP WORD LAST
    :OBJECT REV BL :OBJECT]
  IF LISTP :OBJECT [OP LPUT REV FIRST
    :OBJECT REV BF :OBJECT]
END
```

If you're not clear what this procedure does try typing PR REV [I LOVE ATARI LOGO].

Let's try to analyse and explain what's happening. First, notice REV needs to be given two things. The first is something which can use any output which arises from REV, the second is an input for REV to operate upon.

The first line of REV, as distinct from its title line, checks to see whether the input :OBJECT is empty.

If it is, it causes either an empty word or list to be output, which terminates that call to the procedure.

The second line tests to see if the input to REV is a word. If it is, it builds a new word by taking the last letter of the input and joins it to the results which come from using REV with the ButLast – everything but the last letter – of the input.

The third line tests to see if the input is a list. In this event the first item of the list is subjected to another call to REV and then a new list is built up by placing the results at the end using LPUT – LastPUT – and then using REV on the BF – ButFirst – of the original input. This application of recursion is known as total recursion.

If this example seems rather complex it is because it is a very generalised procedure capable of handling both words and lists, without the user needing to distinguish them.

It is important here to note that the Logo system sees words and lists as being very different. Try this example:

```
PR "ATARI
```

and this:

```
PR [ATARI]
```

What you should see is no apparent difference.

But now, try this:

```
IF "ATARI = [ATARI] [PR
  "SAME] [PR "DIFFERENT]
```

Now you know!

It is important to know where each data type may be used. WORD joins only words together to form one word. SE, or SENTENCE, joins either words or lists. If it's word to word, or word and list, or list to list, the result output is one list.

With either FPUT, FirstPUT, or LPUT there are also two inputs. The first can be a word or a list, but the second must be a list.

The resultant output is either, in the case of word to list, a list with an embedded list and a word, or in the case of list to list, a list with two lists embedded in it.

I want to finish by showing how Logo and lists can be used for numeric manipulation. The three procedures which follow will generate all of the prime numbers up to a chosen level. Try using PR PRIME 50. You should get your results very quickly.

```
TO PRIMEP :N :PRIMELIST
  IF EMPTYP :PRIMELIST [OP "TRUE]
  IF EQUALP 0 (REMAINDER :N FIRST
    :PRIMELIST) [OP "FALSE]
  OP PRIMEP :N BF :PRIMELIST
END
```

The function of this procedure is to take a number and check whether it is a multiple of any of the prime factors provided in the second input.

If there is no remainder after division then the number is not prime and "FALSE is output.

By recursion, the procedure runs down the list of factors until, if the list is empty, then the number must be prime and "TRUE is output.

```
TO SIEVE :N :L
  IF :N < 1 [OP :L]
  IF AND PRIMEP :N - 1 :L PRIMEP :N +
    1 :L [OP LPUT :N + 1 LPUT :N - 1
    SIEVE :N - 6 :L]
  IF OR PRIMEP :N + 1 :L PRIMEP :N - 1
    :L [IF PRIMEP :N + 1 :L [OP LPUT
    :N + 1 SIEVE :N - 6 :L] [OP LPUT
    :N - 1 SIEVE :N - 6 :L]]
  OP SIEVE :N - 6 :L
END
```

It will be necessary to type this in the editor, by typing ED "SIEVE, since there is not the limit on individual line length there which exists at toplevel.

This is the procedure where the "business" is done. The algorithm being used here makes use of the fact that, apart from 2 and 3, all primes are adjacent to multiples of 6, hence the progressive subtraction of 6, and the examination of numbers one more or one less than :N.

There are three conditions which the procedure has to handle. The first is where both adjacent numbers are prime, this is dealt with in the second line, the second is where only one adjacent number is prime – line three – and finally where neither is prime – line four.

At the end of each of these lines there is a recursive call to SIEVE with :N decremented by 6.

```
TO PRIME :N
  OP SIEVE ((QUOT (:N - 6) 6) * 6 + 6)
    (SIEVE (QUOT (SQRT :N) 6) * 6 [2
    3] )
END
```

The function of this procedure is to present SIEVE with suitably prepared inputs – notice one of those is actually a call to SIEVE itself.

The first input is a complex expression which, when evaluated, gives SIEVE the next multiple of 6 above the initial input of PRIME.

The second input is the output which results from a call to SIEVE, which produces the list of prime factors, this early call has 2 and 3 as its initial prime factors.

Atari Logo does not have a QUOT operator, so you will have to write it:

```
TO QUOT :N :D
  OP INT :N / :D
END
```

Try this out, and see what the largest number is that it can handle before the system runs out of memory.

Try out some procedures of your own. I would be interested in hearing about what you produce.

The golden road to successful listings

I FEEL I must write to explain to beginners who are having difficulty getting programs to run which they have typed in from magazines.

When I started typing in programs from magazines three years ago I encountered exactly the same problems.

I would check the listing and my typing dozens of times and not find any errors, so I would write off to the magazine concerned.

I would receive a reply saying that I had made a mistake. So I would check my listing again and again and sometimes after hours I would spot a silly typing error, say a letter O, which should have been a zero.

All I can say is check your typing very very carefully and I can guarantee you will find the error eventually. I still make typing errors even now.

I can't understand why Mr N. Buckle from Kent does not like Antic's checksum methods. I and thousands of other Atari owners find Typo II a godsend in pin pointing typing errors. – **Paul Carfoot, Burton-on-Trent.**

● We're thinking of reprinting this letter every month! If you are one of the many people who have written with problems in getting the listed programs to run, believe us Paul is right.

When we find genuine bugs in the programs we'll print corrections.

Wanted – a full list

I WOULD like to say thank you for a fine first issue of Atari User and to say that you have now filled a void on the shelves of my local newsagents.

In spite of owning a number of books on the Atari micros, I have not been able to find a full list of error messages, and even with some of the ones that I do have I have been unable to decipher the shorthand in which they are written.

I would suggest that if you could rectify this shortcoming in future issues of Atari User you would earn the gratitude of many of your readers. – **T.J. Hurley, Liverpool.**

● Some of the error messages are pretty inscrutable, aren't they? Our favourite is DEVICE NAK. We'll bear your suggestion in mind.

Clean out of REMs

WHEN I bought the July issue of Atari User I typed Bomb Run in on my 800XL and at the end I typed RUN.

Every time I pressed the Return button the computer kept putting up "Error 12 at line 50".

I know that the 12 means that it cannot find line 50.

It did it on the Submarine game and this time it said "Error 12 at line 90". I have checked these two games over and over again.

Could you tell me please tell me how I can make these games run. – **Paul Lynch, Birmingham.**

● Both line 50 of Bomb Run and line 90 of Submarine GOSUB to a REM statement. We suspect you've entered these games without bothering to type in the REM statements.

With many listings this would be fine, but in both these cases the program authors have chosen to jump to a REM.

Typing in the missing line numbers with just the word REM on them should cure your problems without too much extra typing.

Odd dice

WHILE I was reading the June edition of Atari User I noticed that in Random Thoughts on Page 54 the two dice are wrongly printed.

On all dice opposite sides add up to 7. From the numbers visible on both dice this rule does not apply. – **Philip Smith, Walsall.**

● At least it shows that gambling isn't one of our vices.

Poor service

HOW pleased I am to see that we have now got a great magazine, Atari User.

I was feeling sorry that I had changed my computer to the Atari until I got your first edition.

What had got me fed up was the ignorance of Atari UK in Slough.

In January of this year I sent a tape of a program that I was having trouble with and no-one had the decency to reply or send my tape back.

After trying loads of times to contact Helpline by telephone – it was always engaged – I did manage to speak to someone who promised I would be written to in two weeks.

I don't know which century they meant the two weeks to be in, because I still have heard nothing.

Ten weeks ago I got in touch with customer relations at Slough, who told me if I sent another copy of the program they would give it urgent attention.

But then again – silence.

In my opinion, if Jack Tramiel wants to sell his computer in the UK he should come and sort things out at

→

Illumination on luminance

I HAVE owned an Atari 800XL for two months and have just seen your series on graphic modes (issue 1).

Being a beginner I typed in listing 2 and found it only showed one luminance, so I sat down and worked out a listing for each colour and luminance. I think it will come in handy for other Atari beginners.

To pause use Control+1. – **C.M. Hempsall, Nottingham.**

```
10 PRINT CHR$(125)
20 FOR A=0 TO 15:FOR B=0 TO 14 STEP 2
30 IF B<16 THEN SETCOLOR 1,14,14
40 IF B>6 THEN SETCOLOR 1,0,0
50 POSITION 13,12:PRINT A,B
60 POSITION 11,11:PRINT "COLOUR   LUMI
NANCE"
70 SETCOLOR 2,A,B:FOR C=0 TO 1000:NEXT
 C:NEXT B:PRINT CHR$(125):NEXT A
80 GRAPHICS 0:POSITION 16,12:PRINT "TH
AT'S ALL"
```

Atari UK. It's no wonder Warners had to go down with the service Atari gives.

I don't suppose I am the only one who has suffered these difficulties with Atari. If there are others, I would like to hear from them – and I will send their complaints along, with my own, to friends in America who are personal friends of Jack Tramiel. – **G. Whittaker, Swinton, Manchester.**

Room for improvement

I WOULD like to congratulate you on producing such a good magazine and wish you good luck for the future.

But I feel that the magazine could be improved in several ways. Although it is well presented I feel the subjects are aimed too much at novice and beginning computerists rather than the veteran Atari programmers.

So please could you try to broaden your horizons and show us what the Atari really is capable of.

Topics you could cover are scrolling, display list interrupts, vertical blank interrupts, assembly language routines and complex graphic techniques.

Also, how about some photographs in your software reviews section.

Other than that I feel that your magazine is excellent value and is just what we Atari owners need – I mean, who wants to pay three quid for an American Atari magazine? – **Steven Hurst, Horwich, Lancs.**

Why am I locked out?

WHEN I use my Atari 800XL, it sometimes locks up.

It just stops – you can't type anything at all. Even if you press Reset it will not clear the screen.

The only thing you can do is to switch off the computer – and this can make me quite mad, because I lose the program on the computer.

Could you please explain why this happens?

Secondly, could you tell me what the Help button is? It does not seem to do anything. – **P. Cartlidge, Church Lawton, Stoke-on-Trent.**

● If your machine "locks up", you should take it back to your dealer and explain the problem.

For information on the Help key, see our July issue, Page 57.

ATARI USER Mailbag

WE welcome letters from readers – about your experiences using the Atari micros, about tips you would like to pass on to other users . . . and about what you would like to see in future issues.

The address to write to is:

Mailbag Editor
Atari User
Europa House
68 Chester Road
Hazel Grove
Stockport SK7 5NY

Not for homework

COULD you tell me if it is possible to record sounds produced by my computer in the audio channel on my 1010 cassette recorder, and then to use these sounds while loading programs?

This was intimated by Elisabeth Dennis in her review of "Snowball" by Level 9 in issue No. 1. – **David E. Barker, Derby.**

● No, it's not possible to record sounds from your programs onto your recorder.

Elisabeth was referring to programs like Atari's conversational language series which have an audio track alongside the program track on the tape.

This audio track is put on using specialised recording equipment – not the sort of thing you could do at home.

Check-sum a good idea

I HAVE now received both my May and June issues of Atari User and found them very interesting. I particularly liked the 12 page feature on computer communications, and wish I could afford a modem, because it looks great fun.

I thing a check-sum program is a good idea. I was going to write and suggest the idea myself but I got beaten to it.

They save a lot of time and frustration and newcomers are often put off as I was if a program doesn't work after hours of typing.

Please get one soon.

I have a couple of suggestions. My first is that your programs be made available on cassette as well as disc.

I think this is a great idea having all the programs on a disc, but as not many of us can afford disc drives I think a cassette would please many people.

In future issues I would like to see a private ads page for readers to advertise their unwanted equipment and games.

I have seen this sort of thing in other magazines and I think it is a good idea. Apart from these two suggestions I think your magazine is great. – **Luke Hollingbery, Kirby Mallory, Leicestershire.**

Making it childproof

AFTER typing in the Alphabet Train I found a problem. If the user has not got a joystick, the Break key can easily be pressed by a very enthusiastic child, thus ending the program.

If you insert the following lines they will stop this from happening:

Lines 150 & 915, POKE 16,64: POKE 53774,64

As the program takes up nearly all of the 16k, it will be necessary to delete some of the REM statements if the user has not got a machine over 16k. – **Kelvin E. Cuffy, Rayleigh, Essex.**

Monitor questions

CAN you plug in a monochrome monitor and use it at the same time as a TV display – the monitor for text and the TV for graphics?

Which monochrome monitors can be used with the Atari 800XL, and which have standard connecting cables – if any?

Do 80-column monitors show 40 character lines?

Is there any way of making the 800XL show an 80 character line on a suitable monitor by using Peek and Poke, or a machine-code routine? – **J. Smart, Hitchin, Herts.**

● Yes, you can connect a monitor and a TV at the same time, but you will get the same picture on both – one in colour, one in black-and-white.

Any monitor with a composite input connection – that is, almost any monochrome monitor – will work. Cables will probably be wired up as extras, or contact an Atari dealer for a ready-made cable – stating the make of monitor you have decided on.

The picture is generated by the computer, and the monitor just displays it. Hence, any monitor, whatever the number of characters it *can* display,

will only show you 40 characters per line if that is all you feed in to it.

There have been programs which put 80 columns on to a Graphics 8 screen – but they are very long and complex, and in machine code. Try your local user group to see if they have one, or perhaps someone would care to write in with one?

★ ★ ★

COULD you please recommend a good colour monitor with sound output for the Atari 800XL? I can afford to pay around £200. – **Paul Erskine, Belfast.**

● As above, any monitor with a composite video input will do. Ferguson do a nice one, as do a number of other companies. We recommend, strangely enough, the Commodore monitor designed for CBM-64, at between £200 and £230.

The answer to inverse video

THANK you for Britain's most readable "Atari only" magazine.

I bought the first issue out of curiosity, and shortly afterwards found myself buying the second – it must be good.

I'm glad to see you are trying to catch the interest of the younger Atari users – something which hasn't been the custom in the past.

The varied editorials are most interesting, but how about some short demo programs in assembly to allow dabblers like myself to get to grips with the Assembler Editor cartridge?

I have a tip for all Home Filing Manager owners. It concerns the annoying inverse video (italics) printout on Epson type printers.

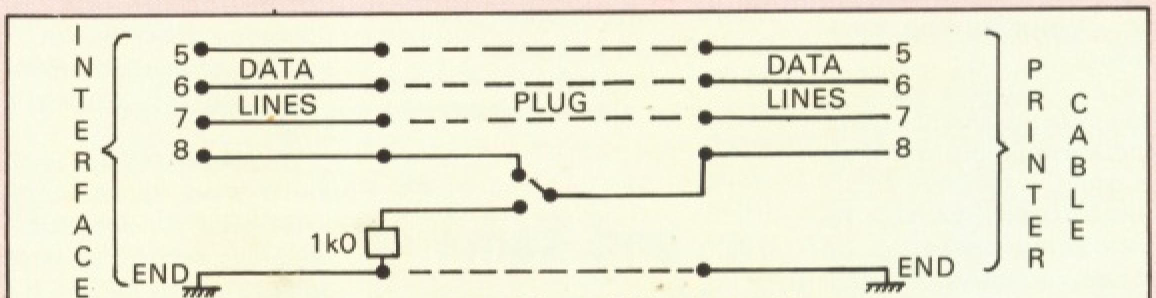
Having spoken to Atari's Helpline, who verified that it was not curable with an easy software fix, I decided to have a go on the hardware front.

The solution lies in the fact that the characters are sent to the printer in inverse Atascii codes. That is, decimal 129 to 255. These generate a 1 in the eighth bit of the parallel interface.

So by grounding the data 8 wire in the printer cable the eighth bit now becomes a 0 and the printer receives decimal codes from 0 to 128.

A miniature single pole double throw switch now resides in my printer plug resulting in 7 or 8 bit operation to suit any program.

I hope this modification is of some use to other readers with this problem. – **R.B. Moss, Hadfield, Cheshire.**



Switch in upper position – 8 bits in use [normal]
Switch in lower position – 7 bits in use [fixed]

Software suits

I AM very pleased with your magazine, especially Mailbag and the lengthy software reports. Keep it up.

In the July edition you gave a report on the new DOS 2.5. You said that it would be free, and to ring the Atari Helpline during office hours to find my nearest user group or retailer who would be able to put DOS 2.5 onto one of my own blank discs.

I rang the Helpline to find out where my nearest user group or retailer was. They told me that I might have to pay 50p or more but no more than a pound to have it transferred on to one of my own discs.

I was satisfied with this and they told me that my nearest retailer was in Leicester.

I went there with my blank disc, but they told me that no way could they put a copy of DOS 2.5 onto my disc for me. They told me it would be around £3 and that they didn't have it in stock. They said that they were expecting it in at any moment.

I have been in again and they are selling it at £3.25 on Memorex discs with a label stuck on saying DOS 2.5.

I am very disappointed at this because I think there is a lot of difference between three pounds and one pound. Atari software isn't cheap and at last I thought I might get something at the right price for a change. – **R. Grace, Leicester.**

● We are offering DOS 2.5 on a disc free with our Disc Doubler. See Page 60.

Lusting after Elite

ALTHOUGH there are thousands of computer games available it's rare I find one I really like.

Recently however I discovered an excellent game on my friend's BBC Micro – Acornsoft's Elite.

Now I've heard they've started to produce versions for other micros. Obviously what I'd like to know is is there any chance of an Atari version? – **D. Barrows, Redcar.**

● We've heard a rumour that an Atari version is being negotiated. For a similar game while you're waiting try Star Raiders.

Incidentally, the rumour suggests a 68000 version called Star Rider.

Upgrading the 520ST

I AM glad that someone has started a British magazine which is Atari orientated and is easily available at most newsagents.

I have several points that need to be clarified and so I decided that your column might be able to help. I have owned an Atari 800 for three years and I am very interested in the new ST series.

However after contemplating placing an order I have decided that I need to have available the answers to the following questions.

First of all, if I purchased a version of the 520ST with a disc orientated O/S could I upgrade it to a ROM version when the ROMs become available?

Secondly, does the ST manual contain a thorough memory map or will I have to purchase one when one becomes available?

Finally, in my collection of 300 magazines there is not one review of DR's Personal Basic. Do you know where I might be able to find out about the standard, if not the ST's, version of Personal Basic?

Having already written to Atari (UK) and only receiving their standard sales leaflet, I would be very grateful if you can help me. – **Jason Hopikins, Leicester.**

● ROM upgrades will be available to purchasers of

→

disc-based Gem systems, probably in the autumn.

The answer to your second question is not known at present. The Basic manual *might* contain some form of memory map, but the Gem manual certainly doesn't.

We don't know of a Personal Basic review either. Try writing to Digital Research themselves.

Atari link-up

I HAVE an Atari 400 and am hopefully going to buy a 65XEM when it is released.

I would like to know if there is any way I can connect these two together for a computer link-up. – **Peter Dunlop, East Kilbride.**

● You can connect the two machines via the joystick ports to send information from one to the other.

However you'll be able to use the same cassettes or discs that you've used on your 400.

Of course this assumes that the 65XEM ever sees the light of day.

User group needed

LAST Christmas I treated myself to the 800XL 1050 disc drive and the 1027 printer. It is all very confusing, but I am enjoying myself enormously trying to understand it all.

I would be very grateful if you could possibly help me with the following:

● *How do I find out if there is an Atari user group in my area?*

● *Could you advise me the best software package to insert separate 12 month's sales figures for 1984 with the annual total – then as each month's 1985 figures are fed in drop the corresponding 1984 figure, calculate the moving annual total and project what the 1985 total figure will be.* – **F.J. Savage, Leeds.**

● There doesn't seem to be a user group in the Leeds area, but try calling the Atari Helpline just in case they've recently received news of one.

You need Visicalc or Syncalc to do what you require. Visicalc is not as good as Syncalc but will do what you want with no problems.

Looking for a book

IN the June edition of Atari User there was the listing of a game Submarine by Vince Apps, one of 40 educational games listed in a book published by Granada Collins.

So far I have been unable to obtain a copy of this book, and I wonder if you can tell me where I may obtain one. – **R.H. Cook, Leicester.**

● Any decent bookshop should be able to order it for you.

. . . and some software

I WOULD like to congratulate you on a fine magazine for the Atari. I've got it on prescription (also subscription) as I've felt sick about the lack of support the Atari seems to get.

On a recent visit to Boots I found they stocked the 800XL but little software, yet for the Commodore and Spectrum there was plenty.

What is the point of stocking the hardware if you don't stock software? There are many products for the Atari available by mail order, the problem being that unless you have tried the product before you buy it you can be very disappointed.

So, dealers, please give the support the Atari and its owners deserve. – **P.D. Little, Carshalton.**

Failure to save

I HAVE an Atari 800XL having upgraded from a 400. This step in the available RAM has increased my programming skills.

So I wonder if you could tell me if there is an additional RAM pack for the 800XL to hopefully boost it up past that point. Not only RAM – is there one for ROM? Also do you know if there are any programs available to increase the baud rate on the 1010 data recorder? – **Craig Brankin.**

● ROM is expanded via the cartridge port on top of the machine. At the moment 64k is the maximum for an 800XL in this country.

Baud rate on the 1010 recorder can be changed up to about 900 baud from its current 600 baud.

Beyond this, reliability suffers severely. Programs have appeared in the computer press to achieve this but if any of our readers have written one we'd be glad to take a look at it.

Packing in the RAM

I HAVE an Atari 600XL and a 1010 tape recorder, but I cannot save programs that I have typed in. Can you please help me so that I can save great programs like your Bomb Run on tape? – **Eoin Maewre, Fintray, Aberdeenshire.**

● Unless you have faulty equipment there should be no problem.

With a program in memory and the Ready prompt on the screen, press the Record and Play buttons together on your 1010 then type CSAVE and press Return twice. The program will then be saved to tape.

To load it back in, re-wind the tape, press Play on the 1010 and then type CLOAD and press Return twice.

MORE HAPPENING ON DISC

I WRITE to correct what I feel to be a misconception in your answer to Nigel Ward (Mailbag, July 1985).

You are wrong in saying that games on tape and the same game on disc are of the same size. Zaxxon was specifically mentioned, and in this case the disc version contains missiles and movement in 3D in the dogfight screen which the tape version lacks.

Now without getting too technical, the disc format for such a game does not contain any form of DOS.

Instead the first 6 bytes of sector 1 contain firstly a dummy byte, then the number of 128 blocks of memory to load, then the memory address to start the load in lo/hi format, and lastly the initialisation address, again in lo/hi format.

The operating system extracts this information and proceeds to load the indicated number of blocks.

This is the same format as used for a boot tape, however it does not take any account of any protection scheme that may be present.

Now such a record is called sequential, as each block is loaded in one by one serially until it is fully loaded, so the disc requires no directory nor VTOC, so no DOS needs to be loaded to handle these entries.

A Basic load file on the other hand requires both. Such a file is called a linked file, the main difference being that each sector only contains 125 bytes of program with the last 3 bytes containing information about the number of bytes in that sector, the file number and where the next sector is to be found on the disc. No doubt this will be covered in these pages in the future.

Information from "De-Re Atari" and "Technical User's Notes", although both are heavy reading.

Many thanks for your support for the most superior home computer. – **Derryck Croker, Wembley.**

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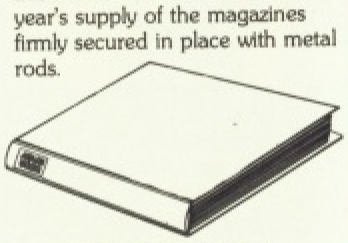
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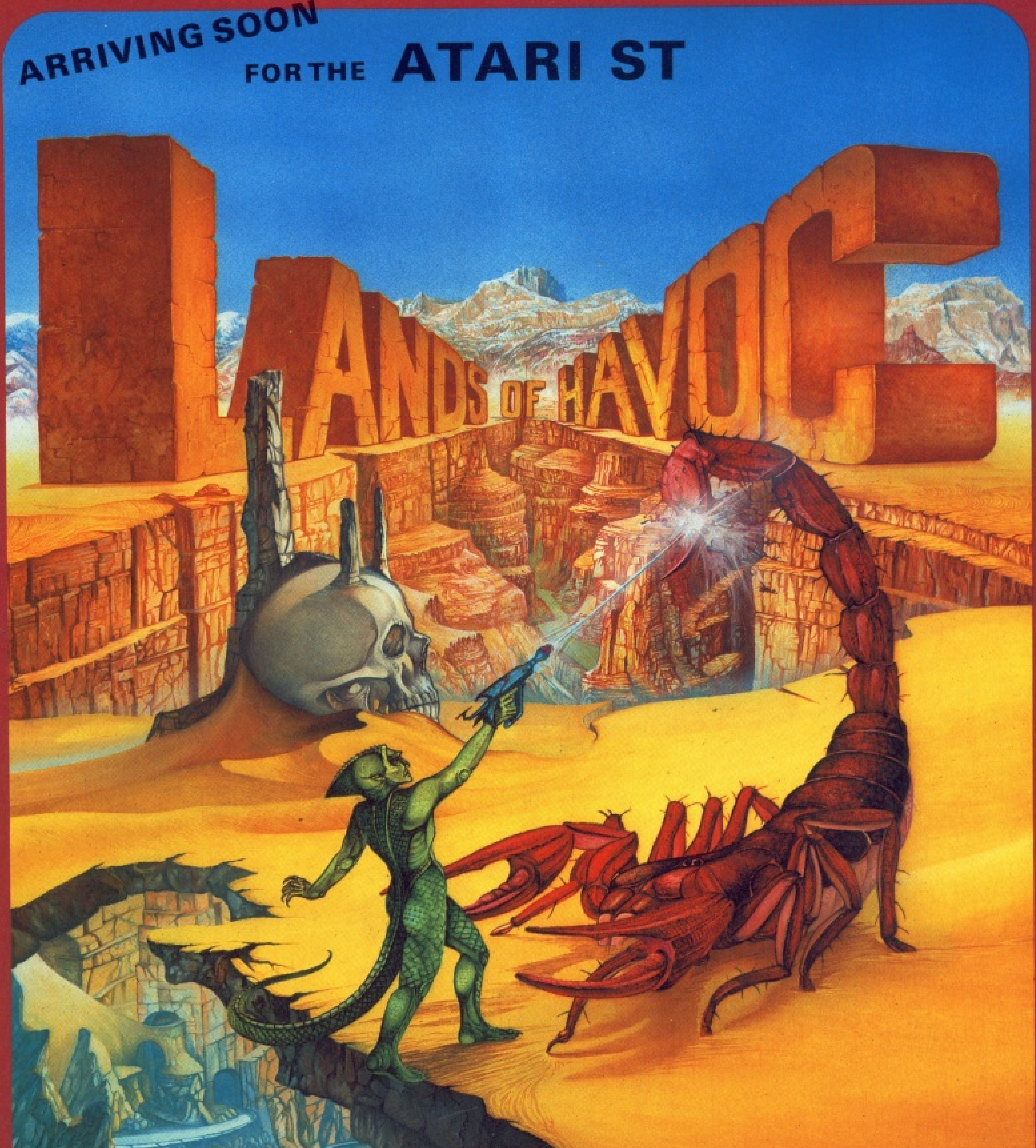
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